MODERN PLASTICS

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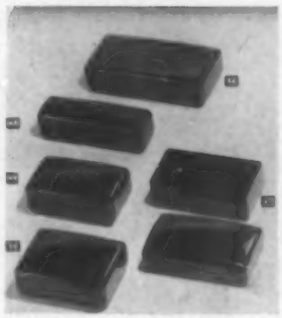
JANUARY, 1936 VOLUME 13 NUMBER 5

• OF GENERAL INTEREST



• TECHNICALLY INCLINED

• NEWS AND FEATURES

NEXT MONTH

Response to our Stock Mold pages in the December issue has been exciting. We had no idea so many manufacturers were just waiting for this to pop. Two more pages (27-28) appear this month and there will be a page of boxes and a page of electrical escutcheon plates in February.

There will also be an article showing how the Gardner Richardson Co., paper board manufacturers, made use of laminated phenolic gears to cut repair costs and obviate costly shutdowns.

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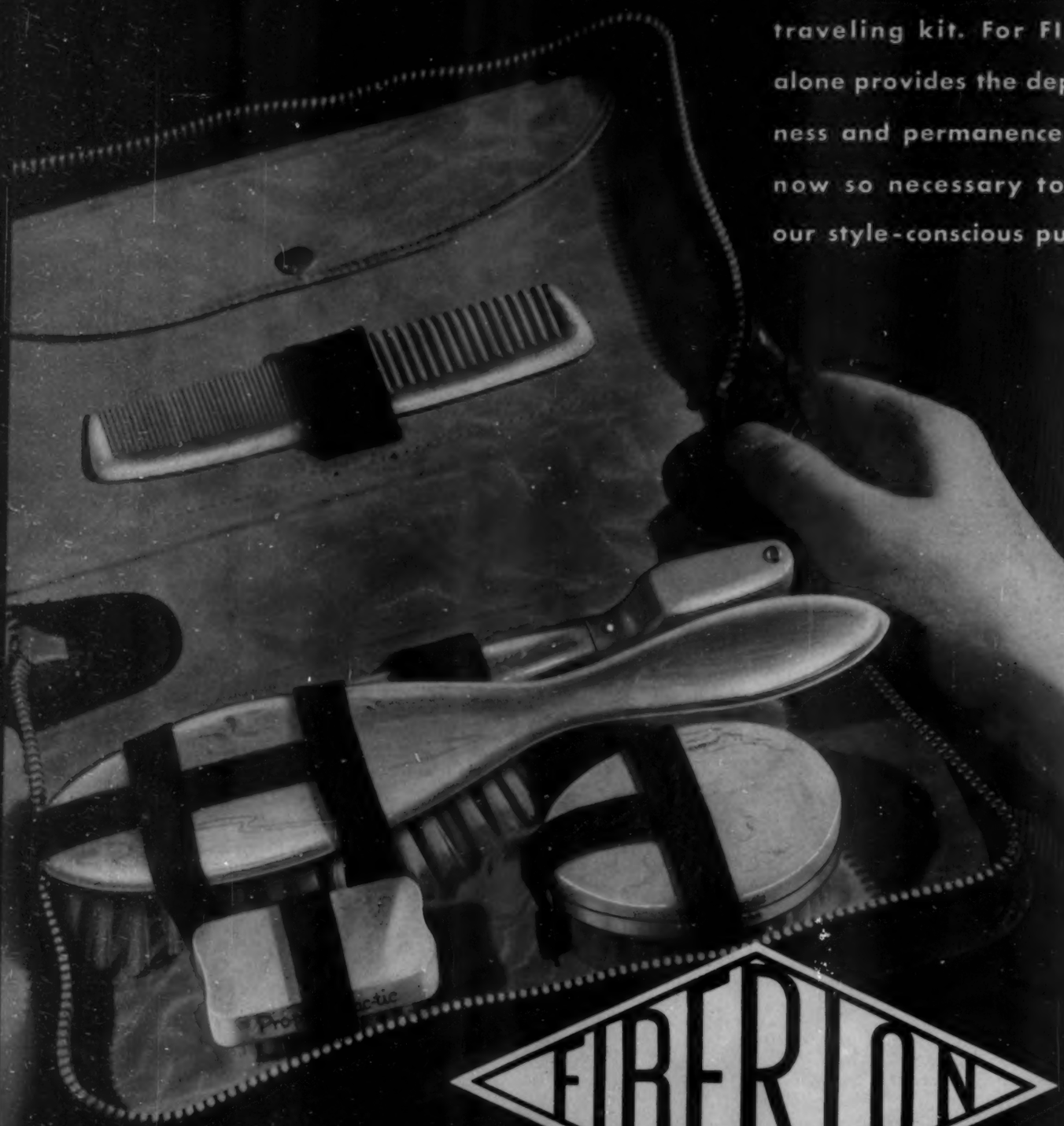

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JANUARY 1936 VOLUME 13 NUMBER 5

—or its optical equivalent

BY E. F. LOUGEE

THE major specifications by the Illuminating Engineering Society for reflectors to be used on lamps bearing the I.E.S. tag of approval used to require that they be made of "white diffusing glass." Recently, this specification has been changed to read "white diffusing glass or its optical equivalent." The addition of these four important words is significant of the scientific research which has quietly progressed within the urea plastics field and indicates its far reaching importance and effect. A certain grade of Beetleware, it has been found, is the optical equivalent of white diffusing glass for light distribution and the I.E.S. after exhaustive tests, has made changes in its specifications which will permit the use of this material.

Plastics, of course, are not new in the lighting fixtures field. They have been used successfully both as molded fixtures and shades. Cast and molded resins have been used as louvres in many prominent installations. Important as these applications have been to the manufacturers of lighting equipment this stamp of approval by I.E.S. gives recognition to the fact that an urea material is the optical equivalent of white diffusing glass—besides having the distinct advantages of being lighter in weight and less easily broken.

In order to present a clear picture of the far reaching effect this will have on the manufacture of lamps, it is perhaps necessary at this point to indicate rather definitely the value of the I.E.S. tag of approval. The I.E.S. certified lamp program was inspired originally by very poor lighting found in a particular college dormitory. Five hundred rooms in sixteen hundred colleges were surveyed before specifications were determined. A portable lamp was developed featuring high efficiency, no glare and a uniform distribution of downward light for desk work with sufficient light reflecting upward to avoid sharp shadows through the room. Then a certification program was launched whereby approved lamps would bear identifying tags proclaiming their superiority. Within a comparatively short time a million lamps bearing the I.E.S. tag of approval have been sold by manufacturers who produce such lamps within rigid specifications laid down by the Society.

One of the principal features which distinguishes these lamps from others is the reflector (Fig. 4) which has a reflecting factor in the neighborhood of 0.65 with a sufficient area and transmission such that with the lamp filament placed 2⅞ inches from the top, the brightness up to 60 deg. will not be more than 3.0 candles per square inch. Originally this reflector was developed in a white glass and until the recent change in specifications was brought about no other material was approved for this purpose.

According to D. W. Atwater Manager of the Commercial Engineering Department of the Westinghouse Lamp Company who for the past three years has been General Secretary of the Illuminating Engineering Society and a member of their committee on portable

FIG. 1

All-molded boudoir lamp of Beetle which is sold at a popular price in retail stores. Six colors are at present available

FIG. 2 Study lamp with Beetle reflector, parchment paper shade and bronze base bearing the I.E.S. tag of approval. Made by the Artistic Lamp Mfg. Co. A double-exposed picture at the right shows the relative proportions of the reflector and the shade FIG. 3

lamp specifications—"Our studies show that translucent plastics are suitable for use as lighting accessories. This material, however, should be used with a full understanding of its physical properties and its light control characteristics. The development of a Beetlware reflector for the I.E.S. study and reading lamp was completed only after considerable time and with most careful designs. Its use in certified lamps should give further impetus to the Better Light, Better Sight activity."

The development of an urea reflector which would meet these rigid specifications has been going on for the past year and a half, but the first lamp with a Beetle reflector bearing the I.E.S. tag of approval (Fig. 2) reached the market last month from the plant of the Artistic Lamp Manufacturing Company in New York.

"For a long time," says Frederick Schwartz, general manager of this company, "we have experimented with plastics trying to find a material that would be less fragile than glass yet sufficiently diffusing to make a good reflector. Until 1934, our floor lamps for indirect lighting were all made with metal shades which placed definite limitations on this type of fixtures. We knew if we could find a material less fragile than glass yet one which would allow some light to diffuse through the shade, that the fixtures would be much improved and would undoubtedly meet with more popular acceptance. We tried urea at that time, but it would not stand the heat of a 300 watt lamp and metal seemed to be the only alternative.

"When we learned that Beetle had been approved by the Electrical Testing Laboratories and that reflectors made from it could bear the I.E.S. tag of approval, we lost no time having molds made from which these reflectors could be produced in quantity. We haven't reached the point yet where all our study and reading lamps are equipped with the new plastic reflectors but we shall soon be able to get them in sufficient quantities to supply the demand. We are looking forward to the economies in shipping and handling which these new reflectors make possible and retailers, too, have welcomed them for similar reasons. We have been making these same study lamps for the past year and a half but with glass reflectors."

The Artistic Lamp Company was the first to introduce Tri-lite (registered trade-mark) a lamp which gives 50, 100, or 150 watt lighting with a three step switch. This gives added value to the study lamp made by this company because of its added flexibility and greater light output.

The same principle applied to floor lamps made by this company has practically replaced the old style of metal reflector lamp for indirect lighting. These floor

Note the perfect light diffusion indicated by lack of any dark spots on this lighted reflector

FIG. 4

lamps are equipped with reflectors not unlike those on the study lamps. Fitted with the three step switch and a two-filament lamp they provide added flexibility in operation with a choice of three intensities of light from the single bulb. The urea reflector serves both to diffuse the downward light and intensify the reflected light toward the ceiling.

"Our first experience with plastic lighting fixtures," says Mr. Schwartz, "came with improving our Mor-light adaptor (Fig. 5) which was originally developed with a glass shade. The Mor-light adaptor is a fixture suitable to use in any room where an overhead socket or drop cord is installed. When overhead fixtures first became popular no shades were used and the glare of the bare bulbs was not only bad for the eyes but hideous to see. Mor-light overcame this objection by offering an inexpensive inverted globe attached to a screw-in socket by substantial metal wire brackets and an opening at the bottom with a chain pull to turn the light on and off.

"While this fixture gained instant popularity and made modernization possible without any great investment by the consumer, we felt a little shaky about its installation. You see, the fixtures were sold over the counter and their installation was frequently up to the woman of the house who had only to screw the extension plug into the existing socket and put in a bulb. It sounds simple enough but wherever the installation of electrical equipment is left to the consumer there is an element of carelessness always present. An element of danger was present as well. Although we never knew it to actually happen, it is easy to visualize a family gathered around the dining table and estimate the physical damage if the fixture overhead, through careless installation, should fall. The glass shade constituted the element of danger in this instance so we turned to plastics for its very successful elimination."

Mor-light with its Beetle shade has the efficiency of white diffusing glass, being its optical equivalent, yet the danger of physical damage to those seated around the table is practically eliminated should it fall. In the first place it is not nearly as heavy as glass, therefore it would fall with less impact. Furthermore, it is not shatterable like glass and the most that might happen would be that it might possibly crack. Molded urea, because there is less loss through breakage in handling and because shipping costs are less due to lighter weight, permits lighting fixtures in which it is used to sell at more reasonable retail prices generally.

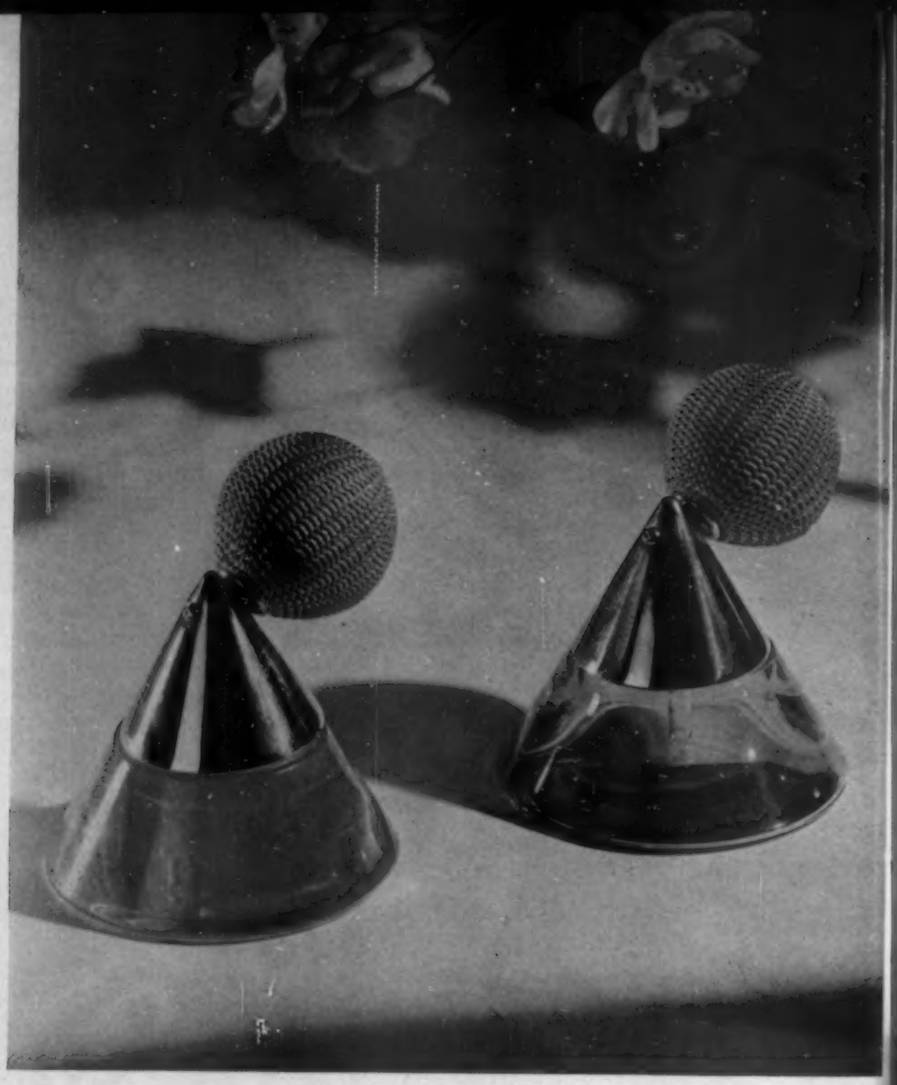
Another type of inverted *(Continued on page 45)*

Two overhead fixtures with Beetle reflectors. The one at the left, supported by rigid metal brackets and with a chain switch control is made by Artistic Lamp Mfg. Co. The one on the right supported by flexible chains, is made by George Ainsworth

FIG. 5

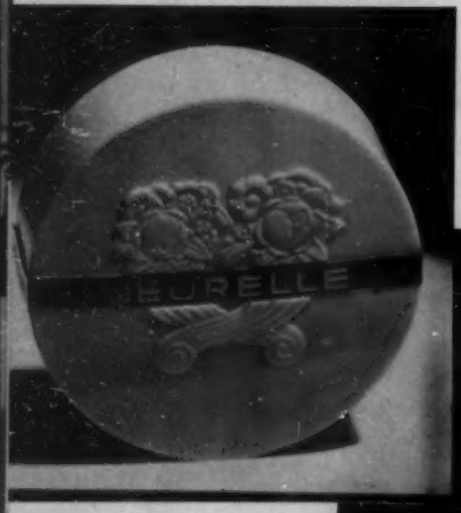
PHOTO, COURTESY JOHN WANAMAKER, NEW YORK

FIG. 6



De Vilbiss atomizer model of cast resin at left shown with its manufactured glass counterpart at right. Designed by George Blow

Schenley gin bottle at extreme upper left is carved and machined from five pieces of resinoid of different thicknesses and cemented together with letters in bold relief. Designed by George Sakier



Jeurelle powder box (above left) carved from a solid block of ivory resinoid with gold metal strap and later molded in urea as seen at right. The Eau de Cologne bottle with urea stopper for Jeurelle (extreme right) was originally carved from resinoid. Original model is shown at left of manufactured product. Both these Jeurelle containers designed by Simon De Vaulchier

Models tell the designer's story

BY EVE MAIN

Professional designs are often developed in models cleverly and accurately cut from cast resins or cellulose plastics. Such presentation leaves little to the imagination of the purchaser

DESIGNING to sell is a common phrase these days and when a designer is commissioned to work out an idea for a new or improved product, he spends no little time in thought and research, experimenting with available materials to determine the one best suited to the project in mind. Once convinced of the desirability of a design from appearance, adaptability and reduced cost standpoints, he must in turn sell his client on its merits. Because executives and business men who for years have conducted the manufacture and sale of certain merchandise do not readily visualize to the best advantage an improvement in their product or a new addition to their line merely by seeing a sketch and description on a flat sheet of paper, designers have made it a practice to submit actual models of the proposed object so its complete details may be appreciated at a glance. These models have been prepared from various materials including metal, plaster, wood, cardboard and paper, accompanied of course, by scaled drawings from which plant engineers may work directly in producing the article. Since they play such an important part in presenting ideas to manufacturers, designers are always on the alert for new materials that will make the original model more closely resemble the product in order that a clear idea of how it will look when produced may be obtained.

Industrial designers in the course of their work have become more or less familiar with plastics of every sort. In many instances they have specified them for decorative purposes and as basic materials for both new design and redesign. Through this experience they have learned that cast resins and cellulose plastics are easy to work with and have the added advantages of color and permanent finish. For this reason a few designers have tried them for modeling and have found them ideal for the purpose and since these materials are available in sheets, rods or tubes, they have no trouble in choosing the size or shape best suited to the job in mind. While such uses will probably never absorb any great quantities of the material, designers will become even better acquainted with its possibilities through handling it and will be more inclined to specify it for certain applications when opportunities occur.

For some six years George Sakier has used transparent plastics in working out designs for glassware and bottles. "I find it the most effective material for the purpose," he says, "especially when the finished article is to be produced in blown glass, because its characteristics and texture so closely resemble the final product. Very often the most beautiful design, depending in many instances upon simplicity for its appeal, looks like nothing at all in a model of plaster or wood because its surfaces are apt to be dull and uninteresting. A transparent plastic model of the same design captures feeling and warmth while rays of

Candelabrum and goblets designed by George Sakier for Fostoria Glass Co. were first carved from resinoid as visual models. No other material from which models might be inexpensively made would present such a faithful picture of the finished merchandise as does resinoid

Hamilton Watch (above) is presented in this molded ivory urea box model for which was originally carved in resinoid by Georges Wilmet. The now famous Handbag Watch by Western Clock Co. was originally modeled in resinoid by George Blow and later molded of both phenolics and ureas. Perfume bottle (below) indicates the versatility of resinoid for modeling unusual shapes of intricate detail

light striking its curves are reflected in much the same manner as glass, leaving nothing to the imagination as to just how the object is going to look when manufactured for sale.

"While searching for a transparent material to use in making glassware models," continues Mr. Sakier, "we tried a gelatin composition. A model was made of wood and the gelatin shrunk on over it. Then the wood was removed leaving a clear, transparent shell to which we attached a plastic stem and base. This type of model looked well but was expensive. Machining models from solid blocks of plastic materials is equally effective and not nearly as costly."

Transparent plastic glassware models require no detailed explanations or descriptions. The manufacturer can decide easily from a group displayed on his desk or table which ones he likes and which ones he feels are not quite right for his line. He doesn't have to guess how the finished piece will compare in size, shape, and character with his other numbers.

Mr. Sakier has created many bottle designs for Schenley Products Co. featuring refinements of convenience and economical production. His original models are invariably made from transparent plastic material because it looks so much like glass. Labels, being designed at the same time and placed in position on the model, appear exactly as they will on the manufactured bottle because the transparency of the plastics brings out their favorable points in the same manner. Placed against opaque surfaces of wood or plaster, these labels do not show up to advantage nor do they give any indication of how they will appear against glass. The model for a new Schenley gin bottle, illustrated, is made of four sheets of transparent cast resin about one-half inch thick. The two side panels are cut away to leave the lettering in bold relief, then the remaining edges are fitted into grooves cut in the front and back of the model leaving an opening through the center. Then the top, which is a separate solid piece shaped on a wood turner's lathe, is cemented in place and the completed model weighs about the same as a glass bottle filled with liquid. It is truly a remarkable likeness in weight, feel and appearance to an actual glass bottle and at the same time will stand pretty rough handling and examining without fear of chipping or breaking. These original models are frequently cherished and displayed by manufacturers long after they have served their intended purpose of presenting an original idea.

As consulting designer for the Fostoria Glass Company, Mr. Sakier has been responsible for many new and improved items of glassware. His enthusiasm and confidence in each new idea are imparted to the manufacturer by means of carefully planned and well executed models. Here again he finds transparent plastics of great assistance. His stem glassware models are machined and etched from solid blocks of the material. Intricate designs can be introduced as readily as simple curves and the model is such a true picture of the proposed piece that *(Continued on page 53)*

FIGURE 1. MARTIN BOMBER. (COURTESY OF THE GLENN L. MARTIN COMPANY)

Transparent plastics for aircraft windows

BY GORDON M. KLINE,
NATIONAL BUREAU OF STANDARDS

ALTHOUGH it is true that no organic plastic has yet been developed that possesses both the qualities and the low price of glass, nevertheless, plastic materials are now serving as windows on many airplanes. Two properties of fundamental importance in the use of transparent materials on aircraft, namely, weight and flexibility, have brought about this invasion of a field generally limited to glass. The organic plastics are approximately one-half as heavy as glass, a distinct advantage for aeronautical purposes. Flexibility is desirable in order to permit the use of curved transparent inclosures (Figure 1) which offer minimum wind resistance.

The plastic sheets which are in common use in this country for aircraft windows are made from cellulose acetate and are known commercially under such trade names as "Fibestos," "Lumarith," and "Plastacele." Cellulose nitrate transparent sheet is also employed to a limited extent; this type of product is variously designated as "Celluloid," "Fiberloid," "Nixonoid," "Viscoloid," and the like by its manufacturers. A transparent synthetic resin made from glycerol and phthalic anhydride is being used in England as a window material on aircraft, but the particular product involved does not possess the flexibility characteristic of the cellulose derivatives. These organic plastics do not possess the surface hardness typical of glass, and the abrasive action of sand, dust, dirty rags, and flying insects soon impair the transparency of the original product. For this reason a laminated product, made by sandwiching a plastic material between two layers of glass and commonly called safety glass, is used in locations where clear and undistorted vision is continuously demanded, as through the windshield directly in front of the pilot. These parts must be designed for flat pieces, however, since the commercial production of laminated glass in curved shapes is very costly and difficult to achieve, although it has been accomplished experimentally.

Some of the detailed requirements for transparent sheets for windshields, inspection windows in wings, and similar purposes as set forth in Navy Department specification 3303a are herewith briefly summarized. The surfaces shall be polished, and smooth, free from wrinkles, bubbles, scratches, pits, or depressions. The material shall be free from dust specks, visible to the naked eye, haze, or undigested fiber. Sheets bent to a diameter of approximately 10 inches in either direction shall not show cracks, wrinkles, or other impairment of surface when released. The material shall be uninflammable, at least to the extent that it shall burn only slowly when a lighted match is held to it. Sheets shall show a transmission of light of not less than 68 per cent within 30 days of date of manufacture. Strips nailed to a wooden bar with 10 No. 14 wire nails driven one-half inch apart along a straight line, shall show no sign of cracking. Test strips soaked in tap water for 24 hours shall not increase in weight more than 4 per cent; similar treatment with oil and gasoline shall not cause an increase in weight of more than 1 per cent. The sheets shall be so cured that shrinkage will not exceed 2 per cent in any dimension. Somewhat similar requirements, differing, however, in numerical values, are stated in U. S. Army specifications Nos. 12014 and 94-12008-A, except that the latter specification, which applies to cellulose nitrate sheet, does not include a flammability test.

Although the cellulose (*Continued on page 55*)

1. PUBLICATION APPROVED BY THE DIRECTOR OF THE NATIONAL BUREAU OF STANDARDS, U. S. DEPARTMENT OF COMMERCE.

Decoration speeds night-life prosperity

BY RUTH LAMPLAND

THE "bright lights" are back in their own this season. Scarcely ten per cent of the theaters, "dark" for the past four years, are still closed, and those only for renovations and alterations. And night clubs, particularly those which present after-theater entertainment in the way of spotlighted singers and floor shows, are booming. The "S. R. O." sign is hanging out many an evening, which indicates the renewed trend of dining out.

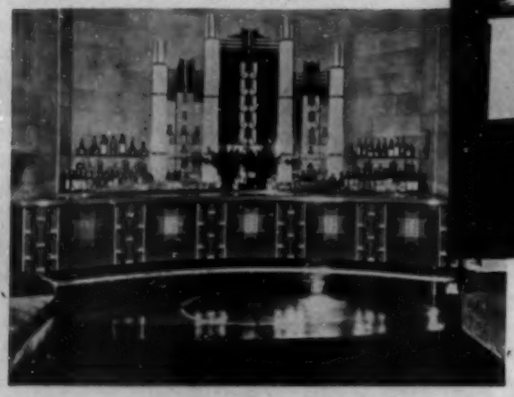
The rush of new business and the return of old has put restaurateurs on their toes, and it has added many new ones to the old list. Managers of popular stars are setting them up in business, or are using the star's name as headlines, managing the restaurant under that name. More than a score of new night clubs have opened their doors this season alone; old ones have gone into redecorating with an almost frightening fury. The rush of patronage—and the even greater rush of competition—is working wonders for the whole field. And modern decoration deserves a great deal of the credit for this revived interest and activity.

Night spots of the country have become as clean-looking as they are intimate and glamorous. The vogue for modern decoration has helped them to achieve both effects. Sleek, shining walls of laminated plastic are replacing plaster. Smooth, lustrous table tops in colors to match the pageant of color in wall and bar decoration are used without tablecloths except during dinner hours. Even elevator doors have been "dressed up" in sophisticated black with inlaid chromium patterns, or in other colors; and bar tops, fronts, and steps of wood are being replaced by the new synthetic materials.

In this field, laminated plastics do a good job. They match exotic color schemes. They are adaptable to all types of surfaces — flat ceilings, walls, table tops, rounded bar rails, bar fronts, pillars, pilasters, bar counters, shelf backgrounds, and chair backs. They

Bar lounge, Carew Tower, Cincinnati

Essex House bar, New York City



Twentieth Century Club bar, Philadelphia

Netherland Cafe and Bar—Sherry Netherland Hotel, New York City

PHOTOS COURTESY FORMICA INSULATION CO.

Cocktail lounge, Jefferson Hotel, St. Louis

Famous racing bar, Louisville, Ky.

Capitol Room, Carlton Hotel, Washington, D. C.

Castle Farm bar, Cincinnati

Submarine Bar, Brevoort Hotel, Chicago

Mirror Bar, Netherland Plaza, Cincinnati

have the practical quality of resisting acids and liquors, and are easily sponged and cleaned. And they are as decorative as the ingenuity of the designer will allow them to be. Inlaid with patterns in metal and in contrasting colors, they can rival the beauty of elaborate mosaics or murals, or they can fit into the most classic, simple setting, in their simplest form—plain colors.

Leading architects throughout the country, realizing the adaptability of laminated plastics to this field, have been applying them successfully to the decoration of the country's largest hotel restaurants and dining rooms as well as to night clubs, for the past two or three years. Among these are: Schulze and Weaver, architects of the Waldorf-Astoria and the Sherry-Netherland, New York; Emery Roth, architect of the Essex House, the Beverly, and other large residential hotels in New York; Winald Reiss, who designed the newest and most popular of the Longchamps restaurants, at 58th Street and Madison Avenue, (New York); Nat and Irving Eastman, of the firm of Eastman Decorators, Inc., whose work includes the Park Central Palm Bar and Roof (Coconut Grove) in New York, and the Eastman Room in the Hotel Congress, Chicago; the Joseph Urban Associates, designers of the Persian Room in the Plaza Hotel, New York, the Joseph Urban Room at the Congress, and many others of the more expensive rendezvous, in which these materials have been used.

In and out of New York, the applications of these materials have been successful to an unusual extent. To name the hotels where the decoration of the restaurant and bar has been done with the aid of laminated plastics is to name the best. Decoration has helped speed on its way many a place which had perhaps no better entertainment than its rivals, and perhaps a less effective location. But the proper leadership in the most handsome and individual decoration has helped the top hotels to maintain their lead in popularity.

Longchamps Restaurant at 58th Street and Madison Avenue, New York's newest place to dine, is done in an exciting color scheme of orange-red, vivid royal blue, gold and silver. The theme is American Indian. The decorations of the walls are gold and silver and blue mosaics of primitive design inlaid in plaster. And the tables are of laminated plastics, in a matching orange-red, inlaid with the same metals and blue. The bar, too, is laminated-wainscoted.

The Waldorf-Astoria owes much of the charm of its Palm Bar and the Starlight Roof to the effectiveness of the laminated plastic table tops used in each. In the Palm Bar they carry out a tropical black and canary-yellow color scheme, and tables of narrow oblong shape are simply topped with these materials in plain colors. In the Starlight Roof the table tops reflect the name of the room; a large blue central medallion on each black table top is spangled with five-pointed silver stars.

At the Rainbow Room in Rockefeller Center, 65 floors above Fifth Avenue, laminated plastics are again chosen as preeminent in the field of available materials for table tops. Here a simple pattern of inlaid narrow silver concentric circles on black circular tops give the desired effect, and in the ivory and green informal cocktail lounge on the south side of the 65th floor, laminated plastics in black and silver with silver edges have been used for their table tops.

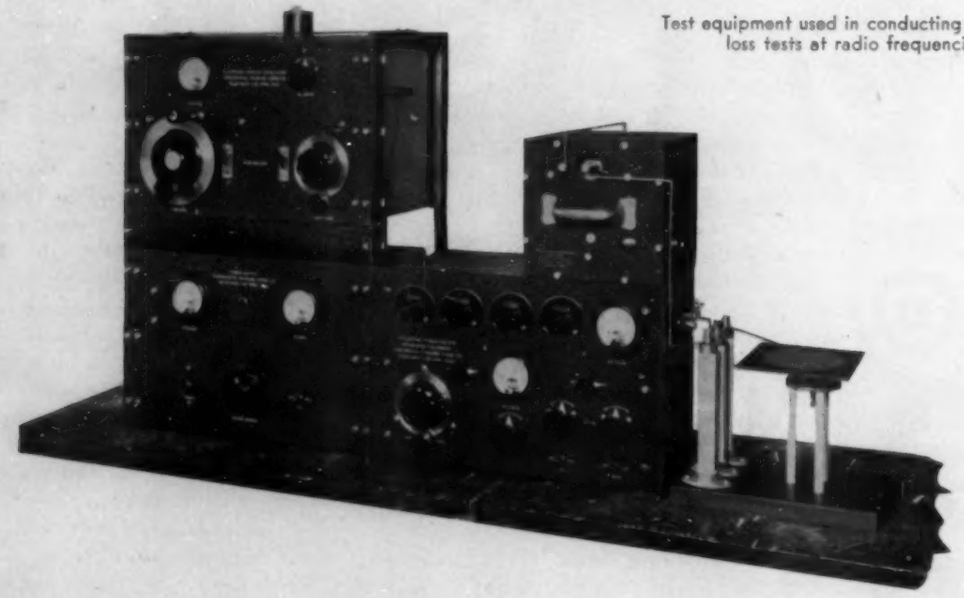
New York's "Arabian Nights" entertainment spot, the Plaza Persian Room, (*Continued on page 58*)

Laminated phenolic for radio insulation

BY A. H. HAROLDSON
CONTINENTAL DIAMOND FIBRE CO.

THE suitability of a material for radio condenser insulation is determined primarily by the magnitude of the power loss. The phenomenon of power loss involves the absorption of energy and consequent heating of the material when it is subjected to an alternating current field. This property is referred to as the phase difference, and is directly proportional to the more widely used quantity, the power factor. The power factor of an insulating material may be defined as the ratio of the total power loss (watts) in the material to the product of the voltage (volts) and the current (amperes) in a capacitor in which that material is the dielectric.

The dielectric constant is an important property of an insulating material. This property is the specific inductive capacity of material. It is equal to the ratio of the capacitances of two condensers of identical size: one using the particular dielectric, and the other using air as the dielectric. The dielectric constant determines the amount of current flowing in a condenser when an alternating voltage is impressed.



Test equipment used in conducting dielectric loss tests at radio frequencies

This property is easily measured simultaneously with the measurement of the power factor.

The loss factor of an insulating material is the product of the dielectric constant and the power factor, providing the power factor is less than 0.1. Actually, the loss factor of an insulating material is the product of its dielectric constant and the cotangent of its phase angle. The loss factor is an expression for the power loss per unit volume of an insulating material at a given frequency.

In the construction of a variable air condenser, it is necessary to support the sets of plates by a solid dielectric. The introduction of this material in the electrostatic field of the condenser necessarily introduces a power loss. The magnitude of the power loss is determined by the high frequency properties of the solid dielectric, and the relative capacities thru this supporting material and that between the plates.

In selecting an insulating material, it is necessary to consider the effect of moisture on the dielectric properties. If the material has a tendency to absorb an appreciable amount of moisture, the power loss may be increased, resulting in diminished selectivity of the radio equipment in which the condenser is used.

A material to meet the demands for radio condenser insulation must satisfy certain mechanical requirements, for the electrical properties are not sufficient criteria of its adaptability. For example, if a material is very brittle, it cannot be easily fabricated into special parts, and if it is too soft it will be difficult to hold close dimensional tolerances in the fabricated piece. Cold flow, which is the property of a material to flow under pressure at normal room temperature, is also associated with soft materials. A soft material which possesses considerable cold flow will cause the plates to loosen, and may result in unstable operation of the condenser.

The use of laminated phenolic materials for radio condenser insulation has been limited due to the comparatively high power factor either inherent in certain phenolic resins, or produced by the absorption of moisture. To determine the effect of moisture, a

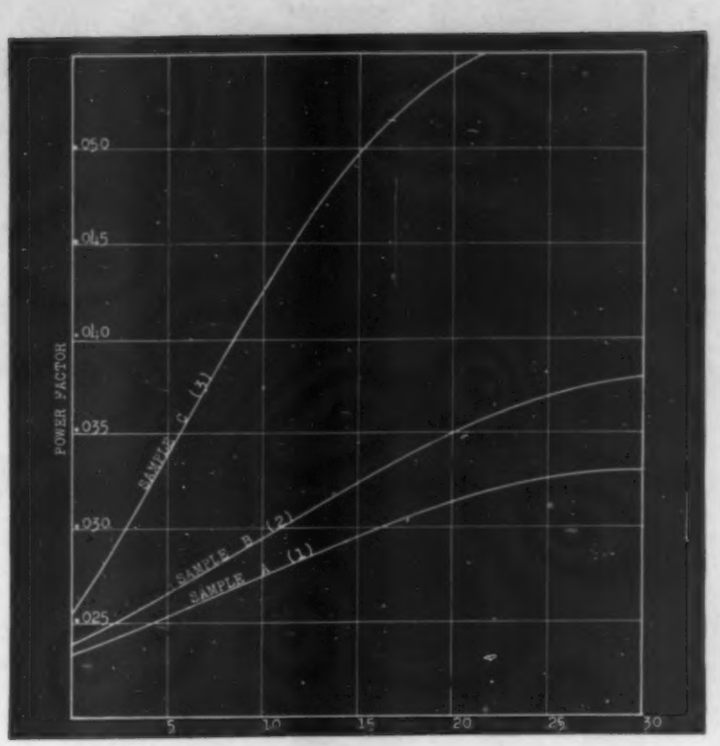


Fig. 1. DAYS IMMERSION. The effect of moisture on the power factor of ⅛ inch thick laminated material pressed at different curing cycles

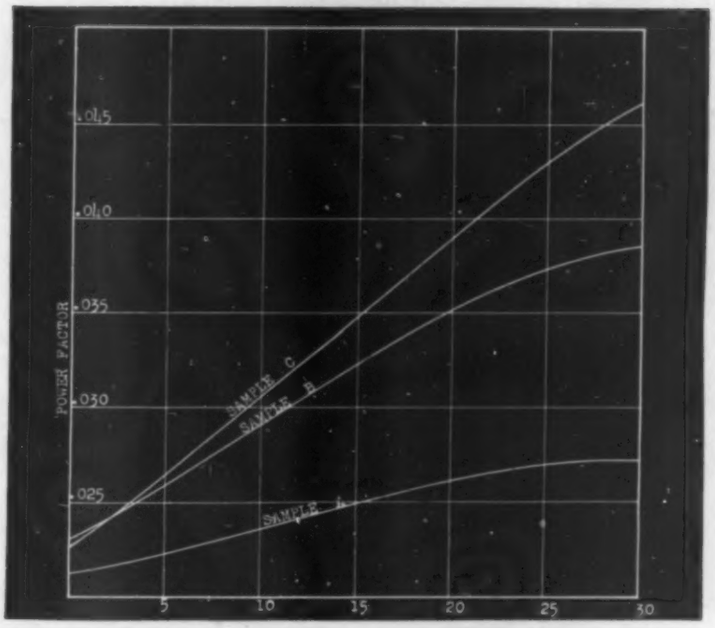


Fig. 2. DAYS IMMERSION. The effect of moisture on the power factor of ⅛ inch thick laminated material in which the surface resin film was removed by sanding

sample of the insulating material is conditioned and then immersed in water at room temperature for a given period of time. The electrical properties of the sample are usually measured before and after immersion in water. The increase in power factor after immersion depends on the amount of moisture absorbed by the material. The amount of moisture absorbed by a sample when immersed in water for a given period of time is a measure of how thoroughly the resin has protected the cellulose fibers against moisture, and also of the extent to which the resin has been converted into the infusible stage. Phenol-aldehyde resins in the fusible stage are more or less hygroscopic, depending upon the extent to which the resin has been cured.

Laminated phenolic insulating material is made by impregnating a suitable paper with a phenol-aldehyde varnish. The solvent is removed by passing the impregnated paper thru an oven. During the drying operation, the resin is converted into a partially insoluble film which is still potentially reactive. A laminated material is formed by superimposing one impregnated sheet upon another until the required thickness is attained, and then subjecting the entire mass, which is placed between pressing plates, to accurately controlled heat and pressure. This operation converts the resin into an insoluble and infusible state resulting in a mechanically strong, dense sheet of insulating material.

An excellent laminated insulating material can be made from dry resin. In this process the resin must have sufficient fluidity when heated to penetrate the cellulose fibers. The dry process has the distinct advantage of not introducing a solvent; but it also has the disadvantage in that the resin is not able to penetrate the cellulose fibers as thoroughly as when a solvent is used. Most of the dry process material is made with shellac, although some of the modified phenol-aldehyde resins are also being used. Shellac is quite resistant to the arc of an electric current, and laminated material made from shellac and kraft paper is used quite extensively where an arc resistant laminated material is required. Laminated sheets made of shellac are not as resistant to moisture as sheets made from the phenol-aldehyde resins.

From the foregoing discussion, it is evident that a laminated material which is suitable for radio condenser insulation must possess a low initial power factor which is not greatly affected by high humidity. Since the base of the material is composed of cellulose which is very hygroscopic, it is essential that the resin used for protecting the fibers be very resistant to moisture and possess a low power factor. Thoroughly dried paper has a lower power factor than any of the known phenol-aldehyde resins, but in the presence of moisture the electrical qualities of paper are very poor. In order to maintain a low power factor in the laminated sheet, the cured resin must be non-hygroscopic. An undercured resin will greatly increase the power factor of laminated material after immersion in water.

Figure 1 shows the effect of moisture on the power factor of ⅛ inch thick laminated material pressed at different curing cycles. The samples were made of the same impregnated stock. Sample "A" was cured for 70 minutes, Sample "B" (*Continued on page 57*)

Greeting new competition

An Interview with W. S. Landes*

BY E. L. FREDRICKS

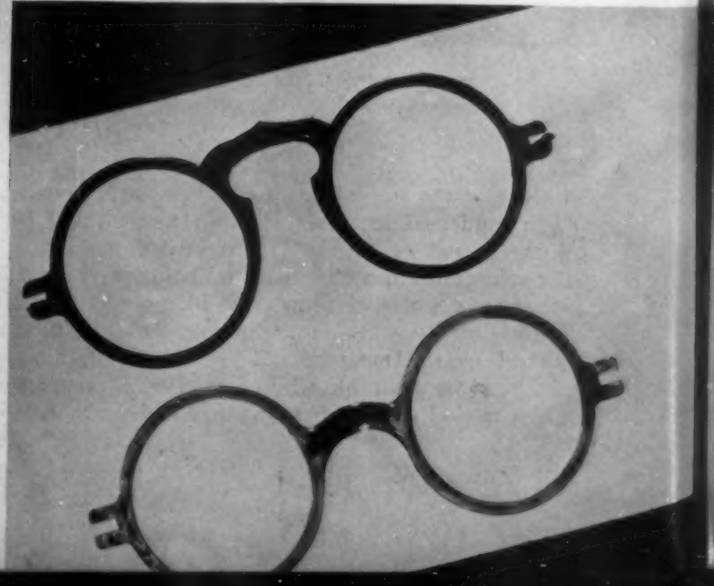
IT IS interesting to note the effect which the rapid growth and development of new plastic materials has had on the cellulose plastic division of the industry formerly called "Granddaddy" of them all. To get a true picture from an authentic source, we went, the other morning, to call upon W. S. Landes, President of Celluloid Corporation, the original company in the field.

"The outlook for cellulose plastics," Mr. Landes told us, "is brighter than it ever has been during my fifteen years' experience in the industry. Strange as it may seem, the advent of phenolics, ureas and other resins are responsible to some extent for the improved condition of the cellulose plastics industry today, for the simple reason that their entry into the field of plastics has helped people to become more 'plastics conscious'.

"The very fact that the phenolic, urea and other resinous plastics were made available at a lower price level than the cellulose plastics has given the necessary impetus to cellulose plastics manufacturers to develop and improve methods of production which have had the beneficial tendency to lower the cost of their materials with the resultant effect that now those using cellulose plastics enlarged their markets and at the same time many new outlets were opened.

"Also it must be remembered that for a long time cellulose plastics manufacturers had practically no competition outside of their own industry, but with the entry of these 'newer' plastics into the field and their encroachment into already established outlets formerly enjoyed exclusively by the cellulose plastics manufacturers has made it necessary for them to adopt a more aggressive policy. Whereas formerly very little advertising was done by our industry it has now become not only necessary but inevitable that we employ all the available channels of publicity to educate the public with the particular merits of our products. Already many of the material suppliers are doing a splendid job

Unique measuring device on NU-TONE TINT RINSE bottle at left fills with measured portion when bottle is shaken, yet pours without allowing additional liquid to escape from bottle. Sun goggle frames of every hue are in great demand at popular prices. Both are injection molded of celulose plastics



* President of the Celluloid Corp.

with educational propaganda, and there is no question that the result of this effort is bringing outstanding properties of each group of materials to the public in their most common forms and applications.

"It can be readily seen, therefore, that the arrival of these other plastic materials and their consequent promotions set cellulose plastics manufacturers very much on their toes. Of course, as I have already intimated, these new plastics have claimed a portion of the business previously enjoyed by cellulose plastics concerns. However, with a more intelligent choice of specific materials to fit definite applications by the users of plastics, and with the ever increasing number of industrial designers using plastics for both basic and decorative purposes, more products of all sorts will be used with a benefit to the industry as a whole. While some business has been lost to these new materials, additional business has come to us because as the demand for plastics increased it has become more apparent to many that cellulose plastics are more versatile, mold more easily and quickly and color configurations are possible to an unlimited degree. Therefore, cellulose plastics will continue to hold their own because of their superiority for numerous applications and will maintain their leadership where unique effects are desired notwithstanding any differential in price."

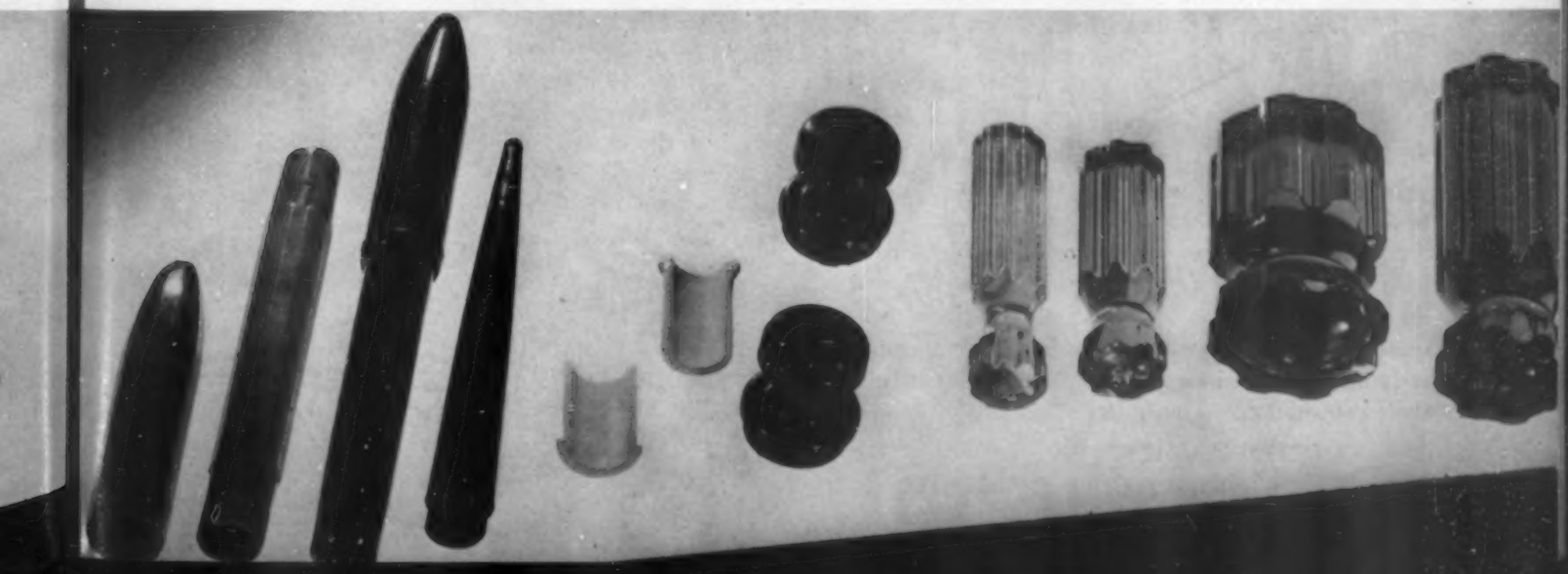
Cellulose plastics are molded with heat and pressure in much the same manner as phenolics, ureas and other resinous plastics. Cellulose nitrate is usually prepared for molding by cutting into blanks, then molded by pressure in the conventional way. Cellulose acetates are molded from either blanks or powders. Where mottled effects are desired slabs with colors already mixed give the best results.

Phenolics and ureas are lower in price per pound than cellulose plastics, although the latter has many offsetting advantages. For instance, to overcome this price differential, improved cellulose molding technique is progressing rapidly with injection type of molding offering greater possibilities from now on. Injection molding is largely automatic, more like die casting of metals. The basic machine has a chamber usually heated by electricity into which powders are fed from a hopper. The injection piston works back and forth letting powder into the heating chamber in one stroke, then forcing the plastic mass through tiny orifices into the mold where it cools instantly. The next phase of the cycle opens the mold and the piece is ejected. Since the mold is water cooled or air cooled there is no delay in the process of filling a second cycle and a one to ten capacity mold is frequently filled and ejected in a ten-second cycle. Obviously, this quick and continuous mass production has tremendous advantages over the slower methods used with thermosetting plastics. Practically the same type of hardened steel mold is used as with other plastics, but it costs less because a smaller number of cavities gives the same quantity of production due to the faster working cycle. The design of molds for injection work is highly important. It requires no small amount of painstaking care and skill to turn out a satisfactory job which probably accounts for the fact that there are scarcely more than a dozen concerns at the present time engaged in molding by injection methods because of the exactness of the technique of molding with this process. A number of others are experimenting along these lines and will undoubtedly enter the field within the next year or two. There are several standard makes of injection machines available and in some instances a few of the molders have designed and built their own machines.

W. S. LANDES

Among the articles now being produced by injection molding are large quantities of sun goggle frames. Originally they were cut from flat blanks with an amount of waste representing nearly three times the material actually required for the frames. The new method has reduced the waste to less than one per cent and the manufacturing (*Continued on page 45*)

Fountain pen parts, knobs, closures and other small objects are excellent examples of injection molding technique. Tool handles at the right in the photograph below are injection molded then metal parts are swaged in afterwards



Editorial comment

SIGNIFICANT of the rapid ascendancy of the plastics trade as one of the nation's leading industries is the fact that the National Bureau of Standards has organized a unit for the study of plastic materials. Organic plastics have been added to rubber, leather, paper, textiles and other industrial materials which are being subjected constantly to rigorous tests and research to determine their suitability for government purchase and use.

● Dr. Lyman J. Briggs, director of the bureau, recently approved the formation of the Organic Plastics Section. The new section is part of the Organic and Fibrous Materials Division, of which W. E. Emley is chief. Gordon M. Kline has been appointed chief of the Organic Plastics Section and is well qualified by experience for the work. He received an A.B. degree from Colgate University in 1925, later attending George Washington University where he obtained an M.S. degree in 1926. He majored in organic chemistry at the University of Maryland 1929-34 (after working hours) and received his Ph.D. degree.

● Prior to going with the bureau in 1929, he worked at Picatinny Arsenal, conducting research investigations on the production and purification of organic compounds for high explosives and cellulose nitrate for smokeless powder. Since 1930, he has been engaged on problems dealing with uses of synthetic resins and cellulose esters.

● Plastics are not new in Government service. For a number of years they have been employed, as in private enterprise, in their well known applications of insulation, metal coverings, and in other capacities, but the establishment of a plastics section at the National Bureau of Standards indicates the importance they have attained. It indicates, too, that a wider use will be made of them by the Government in the future, and that new developments will be more closely studied and recorded for the benefit of all industry throughout the country.

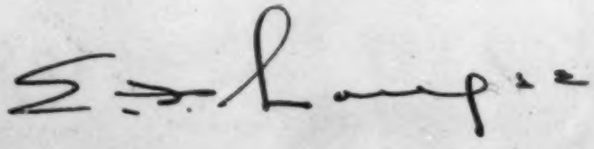
● It is not the policy of the bureau to compete with private laboratories. It is the principal laboratory for testing supplies purchased for government use. Tests for individuals or firms by methods already standard, for which industrial testing laboratories are equipped, are avoided. The bureau's researches begin with requests from the government or from scientific and technical organizations and are often conducted with their cooperation. The object is usually to develop better standards of measurement, quality, performance, or practice. The facts and figures resulting from these studies are made available through publications.

● Of interest to the bureau at the moment is an exhaustive research into the available supply of transparent plastics for aircraft windows. These materials because of their toughness and flexibility are particularly suitable to use in airplanes where visibility is imperative above and below yet with the danger inherent in a shatterable material completely removed. Their lighter weight is another advantage of considerable importance in aircraft construction. Dr. Kline's article "Transparent plastics for aircraft windows" which appears on page 17 will serve to illustrate the nature of the research being undertaken.

● With aircraft and radio occupying the strategic point of supreme importance they do in our structure of defense, the necessity of research in molded and laminated plastics for insulative and structural uses becomes obvious. The bureau is well equipped to subject these materials to any desired test of performance under any given set of conditions.

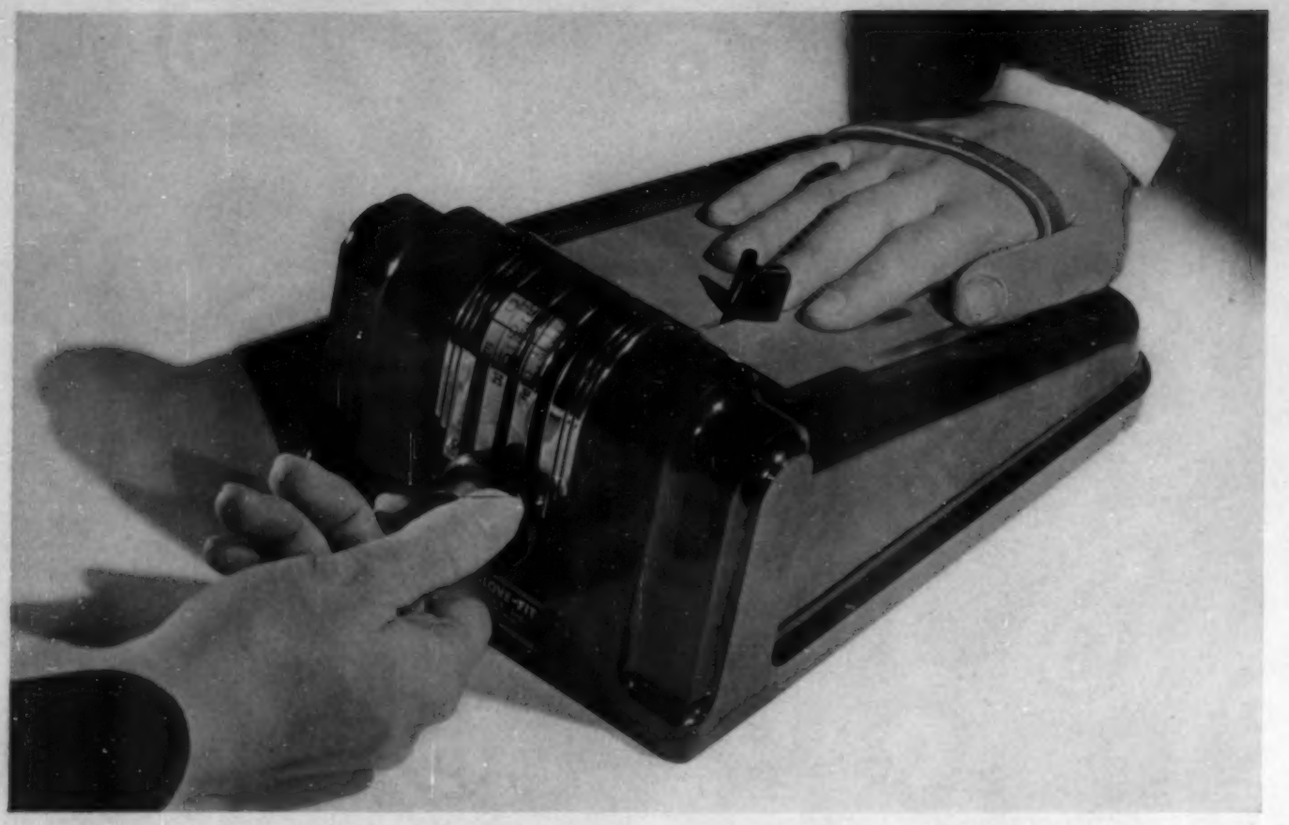
● Exciting new types of transparent plastics other than those of cellulose derivatives are being developed in this country and offer extremely interesting possibilities at the moment. None of these, however, has reached the point where it is ready for commercial distribution. Their qualities of transparency and visibility compare favorably with those of glass yet the material is sufficiently flexible to permit bending into a complete circle of reasonable radius without cracking or damage.

● Similar plastics, we have been told, have been in use in England for some period of time. Acrylic and methacrylic ester polymers have been developed over a period of years in Germany by Röhm & Haas, A. G., Darmstadt, who also produce commercially the glass-like polymer in sheet form under the name of Plexiglas which is shown in the opposite illustration. The American Company of Röhm & Haas and its associate company, The Resinous Products & Chemical Co., Inc., are producing these products commercially under the names Plexigum, Acryloid, etc., for use in laminated glass, as coating materials, insulating materials, adhesives, etc. The manufacture of the glass-like sheet material is now under way in this country and its development will be reported in these pages as soon as definite information of practical industrial use becomes available.



Synthetic organic resinous glass

now made abroad, is being developed here



Gloves scientifically fitted

BY DON MASSON
BAKELITE CORPORATION

PEOPLE will no longer have to buy gloves by trying on several pairs before they find the right size. The Glove-Fit is the latest scientific device that has been developed to measure hands accurately and give finger lengths in terms of glove sizes. The old practice of trying on gloves for proper size has long been a source of annoyance to retail stores and glove manufacturers, because it has resulted in soiled or shopworn gloves which must be sold as "seconds" or returned to manufacturers.

Faced with this situation, Gates-Mills, Inc., makers of Gates gloves, decided that if a device could be constructed to measure hands scientifically for correct glove sizes, the soilage and returns from counter handling would be greatly reduced. It would also save much time for both sales clerks and customers.

Professor A. C. Davis, consulting engineer, of the Sibley College engineering school, Cornell University, was called upon to develop this special mechanical instrument. The result of Professor Davis' efforts is the new Glove-Fit attractively designed and housed in a molded plastic case. The entire mechanism of the Glove-Fit is a self-contained unit, and the molded case functions as a "package" which prevents dust and dirt from entering.

There are two models, one for measuring women's hands, and the other for men's hands. The right hand is inserted through a metal strap. The middle finger pushes against a movable button as far as the stops between the fingers will permit. The finger button and thin, smooth stops are also molded plastic. After this simple operation the clerk turns the adjustment knob until the metal strap is tightened firmly against the hand. Both hand width and finger length are registered on the dial which faces the sales clerk.

The element of time is also worth considering. New gloves are not quickly slipped on and off when trying them for size. They must be worked on gently and gradually until fingers are fully inserted before exact size can be determined. Trying two or three pairs consumes several minutes of the clerk's and customer's time. Glove-Fit eliminates this operation entirely and the time of the clerk and customer is thereby saved. Clerks can handle more customers in the same given time and customers, getting their exact size without try-on, have more time to shop in other departments.

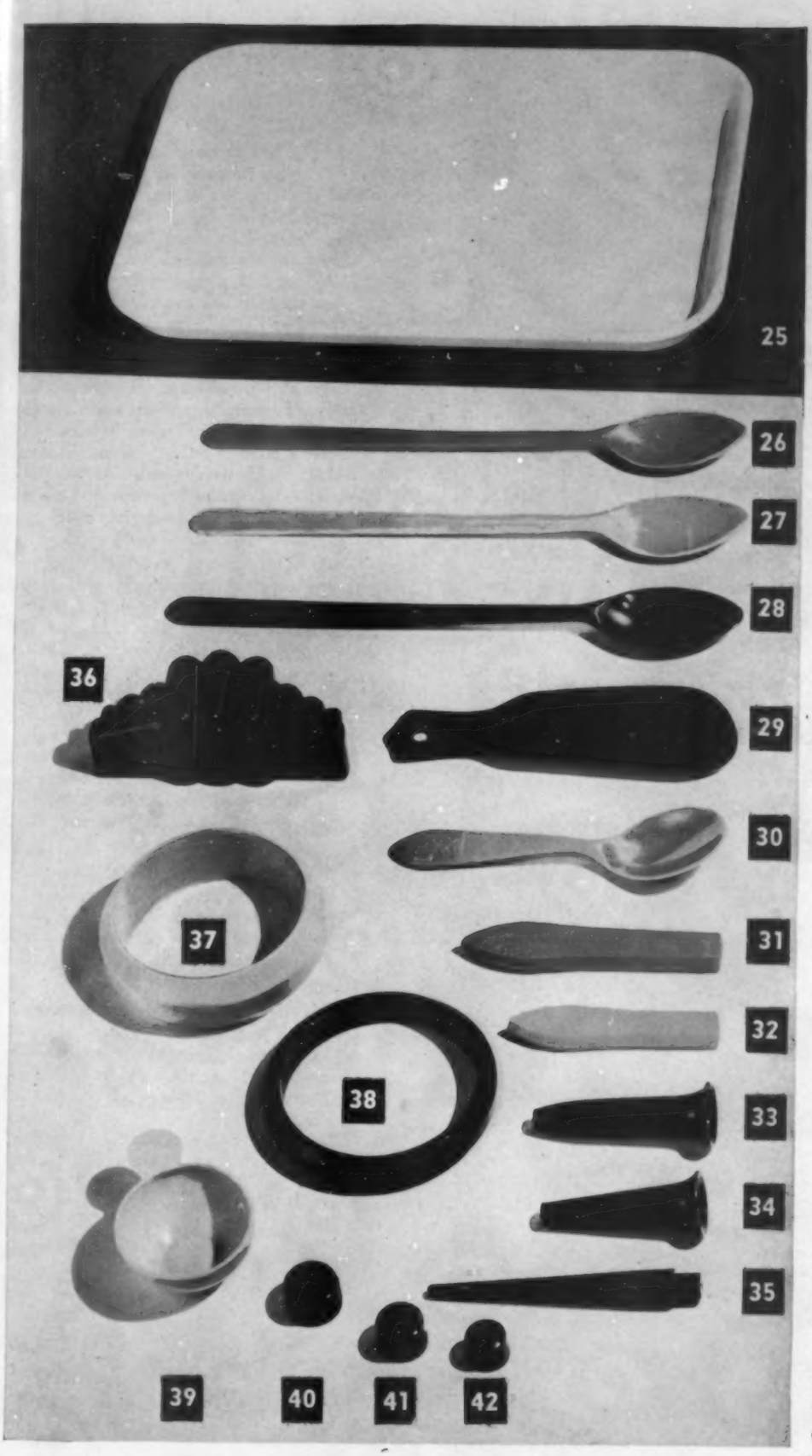
Glove-Fit enables the sales clerk to know scientifically the exact size of gloves the customer requires. Instead of stretching gloves all out of proportion and soiling them, the customer selects the model and color, and the clerk gives him a pair of the correct size.

Credit—To Bakelite Corporation for the phenolic molding material. To Diemolding Corporation for the molding. To Newark Die Company for the dies.

Stock molds

SHEET THREE

THIS month we present two additional pages (see other side) of molded items available to manufacturers and distributors who do not require plastic parts of exclusive design. Molds for these items are owned by various molders throughout the country and samples and prices in any quantity will be sent to purchasing agents who write us on their business letterheads.



25. Molded white candy tray 9 1/2 in. long. 7 1/16 in. wide and 13/16 in. deep.

26, 27, 28. Iced tea spoons about 8 1/2 in. long with fluted handles.

29. Sturdy substantial molded shoe horn about 5 in. long and 1/8 in. thick.

30. Humpty-Dumpty spoon about 4 3/4 in. long with a humpty-dumpty design on the handle

31. Molded knife or brush handle 3 7/16 in. long with a tapering stem and a hole about 1/8 in. in diameter molded into the end an inch deep

32. Handle about 2 5/8 in. long of same design as number 31

33. Fountain pen socket for desk set. Hole at bottom for attachment fixture. Plain bell, 9/16 in. diameter at mouth and 2 5/16 in. high

34. Fountain pen socket for desk set. 2 in. high and diameter at mouth 1/2 in. Holder has a fluted top

35. Tapering pen tip for desk set fountain pen 3 3/8 in. long

36. Stove or drawer handle with molded holes for two-screw attachment one inch apart from the centers. Practically 1/8 in. wall thickness throughout

37. Molded bracelet about 2 1/8 in. diameter

38. Molded bracelet 2 1/2 in. diameter with plain surfaces and double bevel with flat center

39. Coffee measuring scoop, one cup capacity, with a flat handle. 1 5/8 in. diameter

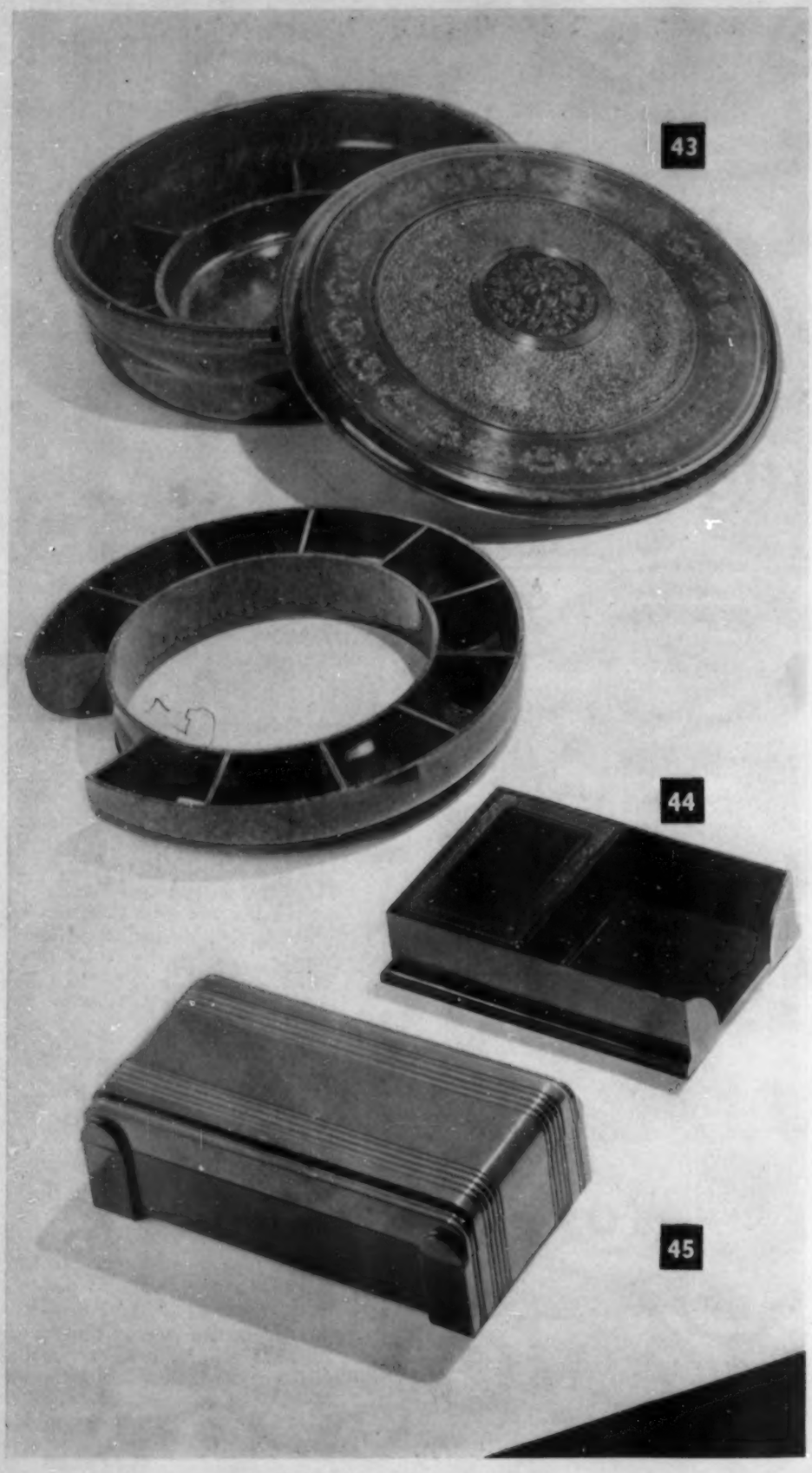
40, 41, 42, are molded closures of different sizes with screw threads. Number 40 has inner seal stem with 1/8 in. opening, others are plain. All have sides with raised design for easy opening.

Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits.

WORTH FILING

Stock molds

SHEET FOUR



HERE are three premium or packaging items which are available in any quantity at most reasonable prices. While these items are not in any sense "in stock" merchandise, they can be molded promptly from any type of plastic material and in any color to suit the purchaser. Remember there is no delay for making molds—they are all ready to be set into a press and the savings thus obtained should appeal strongly to keen buyers. Mention both sheet and item numbers when writing.

Watch this space for additional stock molds next month and you will notice this page is perforated so it can be removed easily for filing.

43. This sewing box has sloping sides and a base which is divided into seven compartments molded into the bottom. The diameter of the inner ring at the bottom is 5 in. Diameter at top of box 8 11/16 in. The inside spool rack has ten compartments each with a depth of 1 3/8 in. Each division is 15/16 in. wide. The upper rack rotates so that anything in the compartments below is available through a space in the inside ring which is left open. The cover is well designed

44. Molded box for desk memo sheets, 5 3/8 in. by 3 1/4 in. with 1 1/8 in. inside depth. The covered section has a panel and border design, otherwise the molding is undecorated

45. Smartly designed cigarette box with hinged cover 6 3/8 in. long by 3 in. wide. 1 1/4 in. deep inside with an overall height of 2 1/8 in. Molded posts at the corners which end in neat curves at the top of the cover make this box particularly attractive

Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits.

WORTH FILING

Buying plastics as manufactured goods

THERE are a number of elements other than price which enter into the successful purchase of manufactured parts of plastic material if complete functional satisfaction is to be obtained. Perhaps the first and most important fact is the development of proper buying methods to bring about a complete understanding between buyer and seller of just what sort of molded parts are required. An exchange of complete and necessary information is of the greatest importance and advantage to both parties if disappointment is to be avoided.

"Too little consideration," says one purchasing agent, "is given to the fact that all plastics do not have identical physical properties. Molded parts should be bought, as manufactured goods, upon specifications of performance and price rather than on a basis of price alone."

A more or less standard method is used by many busy purchasing agents where they get a written request for parts from their factory departments. This request is simply translated into an inquiry for quotations and submitted to several possible suppliers of the required molded parts. If the item has been on the market before and is more or less a stock item, there will be no great difficulty experienced in obtaining definite delivery dates and market prices. If on the other hand, the item is a special one, and of a nature requiring unusual physical characteristics or close tolerances, there is a wide area left open for the molder to shoot at in his proposal. Unless the molder is taken completely into the confidence of the buyer and the uses of the new item are definitely detailed there is a wide open opportunity for dissatisfaction and a likelihood that the piece produced, while within the specified limits of cost, may not be best suited for the purpose intended. Such buying and selling, however, may be done with the best intentions and the dissatisfaction thus arising is difficult to overcome later although the fault lies in the procedure rather than with the individuals.

It seems logical to believe that the buying of molded parts should include consideration of the variables which may occur either in the material, molds or methods of production. These variables can be easily checked once contacts are established and many companies follow a more or less standard practice of buying which is working well with uniformly good results.

This is usually brought about through the purchasing department whereby the manufacturing department responsible for requesting molded parts has the opportunity of informing itself about the physical properties of the materials best suited to the part requisitioned. It is quite common for such departments to establish contact with one or more sources of supply, either molder or material supplier, through its purchasing department. When this is done, costly errors of mold design, choice of inadequate materials, and other disappointments are frequently avoided by the purchaser in advance of establishing his design.

When the part to be manufactured is finally designed, it is desirable to ask at least one molder, and sometimes a material man as well, to review the application with the designing engineers, to effect any economies and to specify the proper grade of raw plastic materials best suited to the job. At such time, commercial tolerances should be decided upon, and unless they are actually required within very close range of specification, they should not be included as they become meaningless because of misuse.

When the purchasing agent is not acquainted with his molder, he should get in touch with him at his plant to observe his organization and his facilities for manufacturing, as well as to establish personal contact with individuals with whom he is to deal. Correspondence and other means of communication are then set up on a more personal basis with increased efficiency. Remember this all brings about a better bond of confidence upon which buyer and seller must both rely for successful results.

Now, when the inquiries are ready for release, the purchasing agent can still invite comments and suggestions from molders on the specification and the standards which he has set up and the final approved quotations will in this manner cover all known conditions of the contract to be entered into.

Summarizing the above, it will be seen that the purchasing agent has a most important function to perform in the buying of molded parts of plastic materials. Perhaps he will say this is equally true in the purchase of all specially ordered parts regardless of materials but he should remember that there is ample opportunity for confusion of materials which when molded into the part specified cannot be distinguished one from another except by laboratory test or in use when it is too late to be changed. The buyer of molded parts is confronted with a comparatively new group of materials which are being constantly improved. This is true both of raw materials themselves and the methods of fabrication. He should be prepared to take every advantage of these changes and make sure he is obtaining the best possible molded part for his purpose. This cannot be judged by a group of quotations alone, but upon confidence established by investigation of what can be had when the full resources of the industry are applied to his requirements. These resources are available to anyone who is willing to take the time to search them out. Or, if original contacts with molders and material suppliers are established on a basis of frank confidence, the benefits of the vast research going on within the industry become automatically available.

When this is done, the matter of prices can usually be reached in a mutually satisfactory manner, and the prejudices which arise against both molders and materials through misunderstandings caused by inadequate cooperation will entirely disappear.

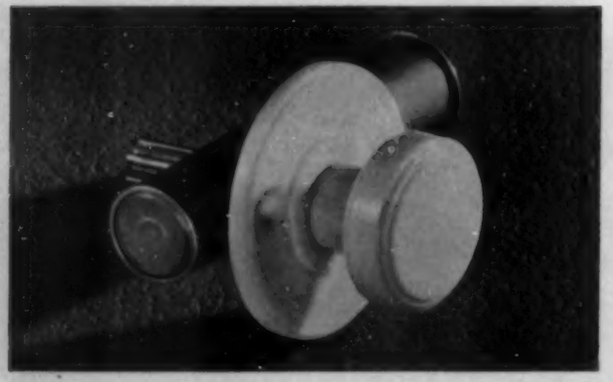
PLASKON

FOR JANUARY ★ 1936

DOORBOLT KNOBS:

Since we mentioned the Plaskon doorknobs that the Lockwood people are selling successfully, more and more hardware companies have been ordering similar pieces for interior and exterior use. The fact that Plaskon is non-metallic and does not chip, peel or check makes it a sought after replacement for metal wall plates, knobs, handles. There is never any polishing needed, and therefore no messy spots left on paint and wallpaper. The Sargent and Greenleaf doorbolt has a Plaskon knob and escutcheon that is a single-piece, ivory molding. Light colors are currently the most popular for this type of hardware for which there are countless shades of Molded Color—offering the manufacturer a wide choice of strong, colorful moldings.

Molded by Reynolds Molded Plastics in Jackson, Michigan.



CAKE BOX:

When placed in most containers, cake soon loses flavor because it either dries out or becomes soggy. Plaskon cake boxes, with air and moisture proof walls, preserve original food goodness. On the merchandising side, their unsurpassed color beauty and permanence are advantageous. A brilliant red box like the one illustrated looks bigger on the shelf than a dark box of equal size. Housewives, aware of a container's reuse value, purchase one cake in preference to another. Plaskon packages are capitalizing on these and other selling helps for every type of product you can imagine. As has been often the case with others, a strong, light Molded Color package may widen the present market for your product.

Molded by the Kurz Kasch Company in Dayton, Ohio.

SALT AND PEPPER SETS:

Although salt shakers have been in use for upwards of five centuries, and one might reasonably expect them to be perfect today, there is still one complaint made about many of them. The Plaskon shaker, however, keeps out dampness and thus permits the salt to flow evenly at all times. These individual sets in orange Molded Color are gay, useful additions to table decoration and exemplify the perfect execution of figured designs in Plaskon. Hot and cold food does not affect nor is affected by Plaskon—because the color is itself a part of the molding, and not an applied finish. As it is also economical, strong, and yet new enough to be different, Plaskon is widely used for novelties and premiums.

Molded by Watertown Mfg. Company, in Watertown, Connecticut.

NEWS NOTES

Plaskon Company, Inc. is the new name of Toledo Synthetic Products. It was midnight New Year's Eve that we lifted a glass gently and greeted 1936 and our new, more explicit name. (All papers please copy.)

* * *

We especially would like to remind readers that molders everywhere have stock molds for many types of products. Big savings can be realized by using molds already on hand. We'll try to locate one for you if you wish.

* * *

Our Research Department will gladly cooperate with you in your material problem. Without obligation, it will make extensive tests of your model, or give an expert appraisal of your idea. For further information, please write us about this.

* * *

Plaskon Parade is a newsy digest of the plastics industry and Plaskon doings. There are plenty of pictures and (we have been told) some good dope. Four-color printing helps you visualize how Molded Color really works. Become a free subscriber by writing Plaskon Company, Inc., 2121 Sylvan Avenue, Toledo, Ohio.

PLASKON COMPANY, INC.

FORMERLY TOLEDO SYNTHETIC PRODUCTS, INCORPORATED

CANADIAN AGENTS, CANADIAN INDUSTRIES, LTD., MONTREAL, P.Q.

MOLDED COLOR

Phenolics in tomorrow's car

BY FRANKLIN E. BRILL

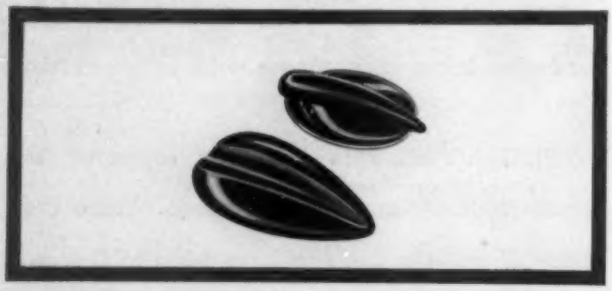
GENERAL PLASTICS, INC.

In which a plastics material man sees opportunities overlooked by many automobile manufacturers

DETROIT is probably the most plastic-minded city in the world today. The Ford plant increases its molding facilities tremendously. We hear predictions that major parts of the motor car will be molded in a few years. Engineers and designers are eager for information, samples, cost data, and rumors of new experimental molds come thick and fast.

Where is tomorrow's motor car going to use more plastic materials? You would be surprised. Even today there are many opportunities to increase gradually the number and scope of non-load-bearing applications, where the lighter weight, inertness, wear-resistance, and permanent luster of phenolic material is especially valuable. We shall attempt to point out a few of these applications here.

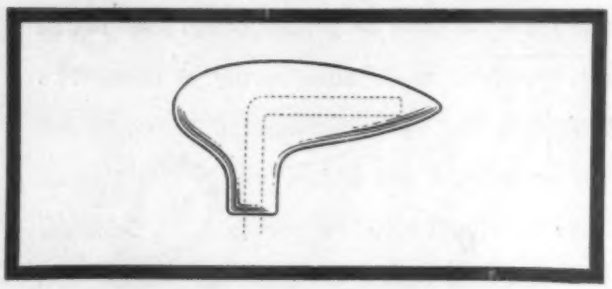
Starting on the car exterior, we can first consider gas-tank caps, because one need only look at the sleek, streamlined cars of today to see that the conspicuously chrome-plated round gas-tank caps have lagged behind the rest of the car. Why shouldn't they, too, be stream-



lined? Why not mold them, in a flat teardrop shape that hugs the fender or sets flush, with an integrally-molded teardrop handle? As shown here, they present a smoother appearance than at present, are lighter in weight and are rust- and corrosion-proof.

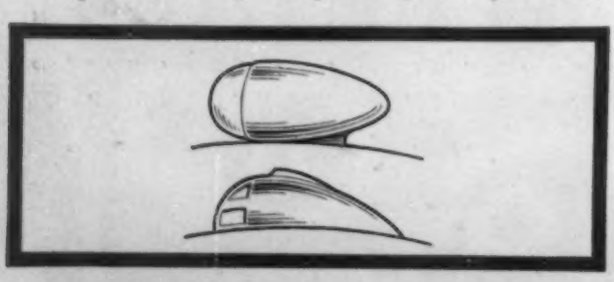
What about fender lights? Some of the new cars have stamped metal light-bodies, while others are die-cast, but a phenolic molding is better than either in certain designs. They're lighter in weight and require no expensive buffing and polishing, and production economies can be made by molding fittings, sockets, etc., integrally. Rust-proofing is eliminated, and holes and inserts can be molded in automatically.

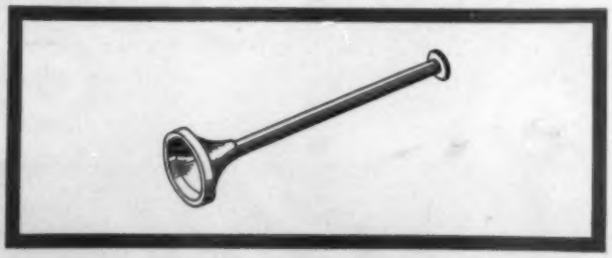
Handles both inside and outside of the car have been die-cast and chrome-plated for years, but with the growing trend toward elimination of excessive chromium we may expect some molded plastic handles soon. At present, differences in coefficient of heat-expansion make the molding of a slender phenolic handle around a metal reinforcing core difficult, but metallurgists and molders may soon collaborate to solve this problem. Even today, though, light-duty knobs and handles of a thick-section, tear-drop shape can be molded, either with or without core, which offer advantages over metal handles, in that they are more pleasant to the touch, lighter in weight, corro-



sion-proof, and the finish cannot wear or chip off. And, as handles give way to solenoid-operated door-openers, flush push-buttons inside and out will naturally be made of plastics.

For mechanical automotive uses, there are many places where molding materials of special qualities and extra strength are found ideal. Ignition parts are one—too well-known perhaps—but materials with resistance to water, alcohol, glycerine, etc., find applications in water-pump assemblies—for rods, shafts, bushings, gears, housings, etc. Carburetors and fuel pumps may hide other applications for extra inert phenolic plastics, but no outsider can say this with certainty. The automotive engineers themselves will have to work these out, remembering that special phenolic materials can bring light weight, inertness, self-lubrication, smooth-finish, corrosion-resistance and surprising strength to many mechanical parts hidden deep in the engine or chassis. But let him remember also, that moldings can *(Continued on page 61)*





Molded cabinets—or wood?

AN INTERVIEW WITH JAN STRENG

BY ALBERT Q. MAISEL

JAN STRENG, DESIGNER

Radio cabinets designed by Jan Streng for Pilot Radio Corp. (one in center) and Emerson Radio and Phonograph Co. (on either side). All three are molded of Bakelite by Associated Attleboro Mfg. Co.

JAN STRENG is a designer who has made a specialty of radios, particularly molded plastic radios. Not that he did so deliberately, but rather because his designs have had a habit of "clicking" with the public and, hence of bringing other radio manufacturers to ring his studio doorbell. I went to see him because I was interested in three of his recent achievements to reach the market; two comparatively large table model Emersons and a Pilot cabinet which measures over seven-hundred-thirty-five cubic inches—one of the largest yet molded in this country.

I soon found our conversation drifting away from the present into the past and future as Mr. Streng developed his designer's thesis with illustrations of radio cabinets designed a few years ago and drawings of cabinets which will be reaching the market late in 1936. To put that thesis into words is a difficult job, for Jan Streng is not easily pigeon-holed. Avowed modernists will not admit him to their select circles because he compromises his modernism to achieve greater saleability. He maintains that the consumer must be educated, gradually, to accept really functional design.

Classicists likewise cannot include him in their diminishing circles, for his designs are essentially "modern" in feeling and the materials he works with are most distinctly modern. Perhaps the only classification into which he fits is that of the "practical" designers—and this, no doubt, is the major reason why the practical radio industry uses so much of his work. Mr. Streng does not talk art. Instead he talks in terms of price, sales, production costs, wearing qualities—all the terms more common in business offices than in designers' studios.

I asked him to tell me the one major advantage plastics offered over wooden cabinets and his attitude was reflected immediately in the answer, "You can sell the same chassis in plastics at one third the cost of a comparable cabinet of wood." As proof of his contention he cited the case of one large cabinet, which he did not identify, as costing only eighty cents as compared with three dollars for its wooden equivalent.

"But do you find price the only controlling advantage?" I asked as a leading question.

"Far from it," he replied, "lower price is largely a reflection of other advantages. Molded plastics permit the designer a freedom which he could not have working in wood. For instance, costs would be prohibitive if he tried to get a cabinetmaker to produce compound curves in wood. Yet these are as easily molded as straight plain surfaces when plastics are used. This is particularly true on table-model radios, where the cabinet is easily moved and often placed upon expensive highly- (*Continued on page 51*)

developments of the month

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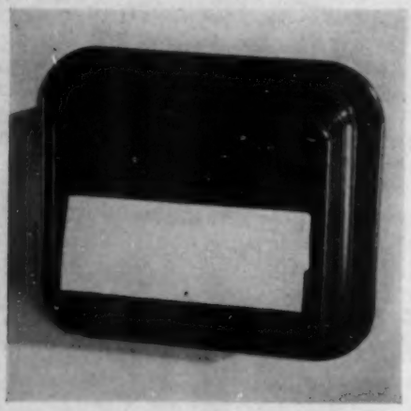

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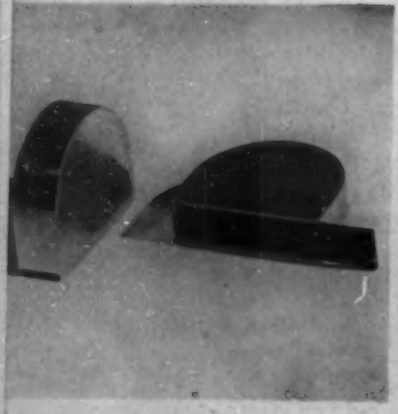

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1. The yarn holder is a handy knitting accessory which keeps a ball of yarn in the proximity of the knitter and off the floor. Introduced by the Consolidated Novelty Co. the holder is light in weight and may be slipped easily onto the wrist. Made of Bakelite cast resinoid

●

2. Standard equipment on the William Hand Motor Sailor, well known ocean cruiser, is molded plastic hardware throughout. All electrical fittings, door knobs, escutcheons and even vacuumn jugs are molded of brown Durez, because of its resistance to corrosion and discoloration in salty atmosphere

●

3. Three new cosmetic boxes recently designed by F. C. Meacham of Northern Industrial Chemical Co., who molds them. The rouge and eye shadow boxes are of white Beetle with decorations in gold, and the mascara box is in brown Beetle with white decorations

●

4. Manufacturers of nail polish are employing to good advantage the Owens-Illinois Glass Co.'s new "Lustreseal" molded caps. Miraglo, Sarane, Kiss-O-Love and Cupid's Kiss proudly appear under these new closures which assure cleanliness, clear color, and unusual luster

●

5. "Deputy" is one of Telechron's most popular electric alarm clocks. Its case is molded of ivory Plaskon with a black phenolic outer bezel and base. Attractive 3 inch square metal dial with light cream background and black and gray numerals, also available in black with ivory base and bezel

●

6. Bluemel Bros., Ltd. of England, has designed a new toilet tissue dispenser of Bakelite molded. Neat, attractive and highly sanitary the dispenser has a permanent finish which may be cleaned easily with soap and water, and will not rust. The color will not wear off

●

7. These modern salt and pepper shakers are made of chromium by the Revere Copper & Brass, Inc. A Catalin slide is notched into the base, opening for easy filling, and the perforated holes are shaped in the letters S and P in larger and smaller holes

●

8. This fourteen piece "Mickey Mouse" toy tea set is being molded of Beetle by Bryant Electric Co. Gay colors make them attractive with or without Mickey Mouse, and these sets would make any child happy. This probably accounts for the enormous quantities in which they are being sold

9. A new phenolic tray which fits into the Remington Rand Kardex cabinets and holds the various colored signals, pencils, etc. is one of the selling features of this new office equipment. Molded in one piece by Norton Laboratories, the tray has five compartments

●

10. The Saba radio set is an example of this year's German molded plastic radio cabinets. An advantage in using plastic materials is that cabinets are molded in one operation and require no finishing other than the removal of small fins where the mold parts come together

11. Jean Muir, popular star of Warner Brothers, was snapped during a visit to New York playing Checards. The cards, an inch by an inch and one half in size, are backed with Catalin in bright shades of red, yellow, green and coral

●

12. Here is a big useful serving tray molded by the Auburn Button Wks. Inc. Simple in design and light in weight the tray is ideal for serving cocktails, sandwiches or even for resting on a table so that bridge players may serve themselves with highballs or water

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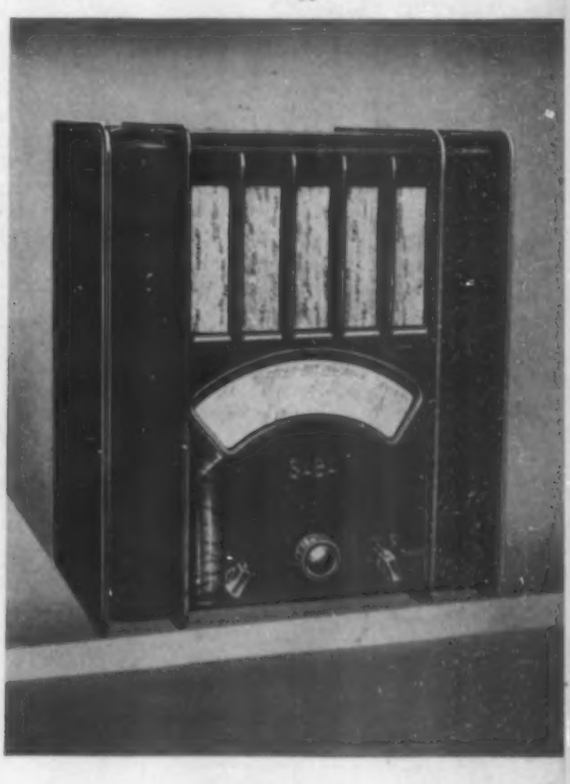

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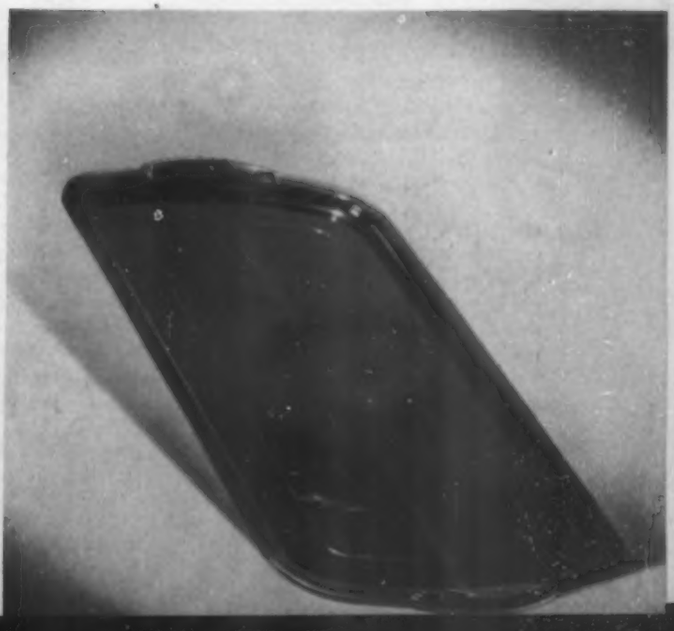


NEW IDEAS

● Molded synthetic resin tableware which is made with a relatively porous, absorptive body but with a smooth, non-absorptive gloss surface formed in contact with a highly polished mold, can be decorated by removing a portion of the gloss surface to expose the absorptive body, then applying a liquid coloring composition. The color may be applied in any desired pattern, for example in the popular "Mickey Mouse" design, to make attractive tableware. (Roy H. Cunningham, Bryant Electric Co., Bridgeport, Conn.: U. S. P. 2,022,587).

● Sound records having a synthetic resin playing face and a metal or paper core (according to whether strength or economy is desired) are made by facing the core with styrene and heating to polymerize the styrene, alone or with a polymerization accelerator such as benzoyl peroxide, or a plasticizer such as paraffin. Records made in this way are suitable either for recording or reproducing sound, and if desired the sound track can be formed in the polystyrene face of the record by means of a master record in a mold press. (International General Electric Co., New York City, and Allgemeine Elektricitäts-Ges., New York City and Berlin, British Patents 413,843 and 414,499).

● Molded tiles, which have sundry uses in plain and decorative building construction, can now be successfully produced from cumar resins, which have hitherto been unsatisfactory for this purpose because those grades which are sufficiently hard are too brittle. To overcome the brittleness without sacrificing hardness is a problem which has now been solved by compounding with just the right proportion of linoxyn. In general, more than twice as much cumar resin as linoxyn is used. Hard, alkali-resisting tiles are obtained. (E. Claxton and M. K. Bare, Armstrong Cork Co., Lancaster, Pa., U. S. P. 2,022,707).

● A cheap molding composition which is suitable for making handles, switch plates, or indeed any molded shapes with or without metal inserts, is obtained by finely powdering lignite, peat or lignin and making up the powder to a paste with aniline. Fibrous or other fillers, softeners, plasticizers and other ingredients are added as required, just as in making other molding compositions. The aniline is used in solution in benzene or other solvent, which is evaporated off before molding. The final molding operation is carried out at high pressures, e.g. 300 atmospheres or even as high as 600 atmospheres, at about 150° C. If desired the material may be made in sheet or rod form; it can be turned, sawed, drilled or filed and will take a high polish. It has extraordinary electrical resistance and so is especially useful in molded insulation. (F. Fischer and O. Horn, Studien-und Verwertungs-G. m. b. H., Mülheim, Ruhr, Germany; German Patent 618,231).

● A new, improved heel for women's shoes has a slotted hollow metal core with a hard fiber top layer, both embedded in a hardened plastic which is molded in the shape of the heel. Attachment is effected by means of a top lift member which has a plug engaging with the hollow core, and a flange with lips which make contact with the molded shell and also engage with the slots in the metal core of the heel. (Chas. M. Riddock, Andover, Mass., assignor of one half to M. H. Rourke, Boston, Mass.; U. S. P. 2,023,441).

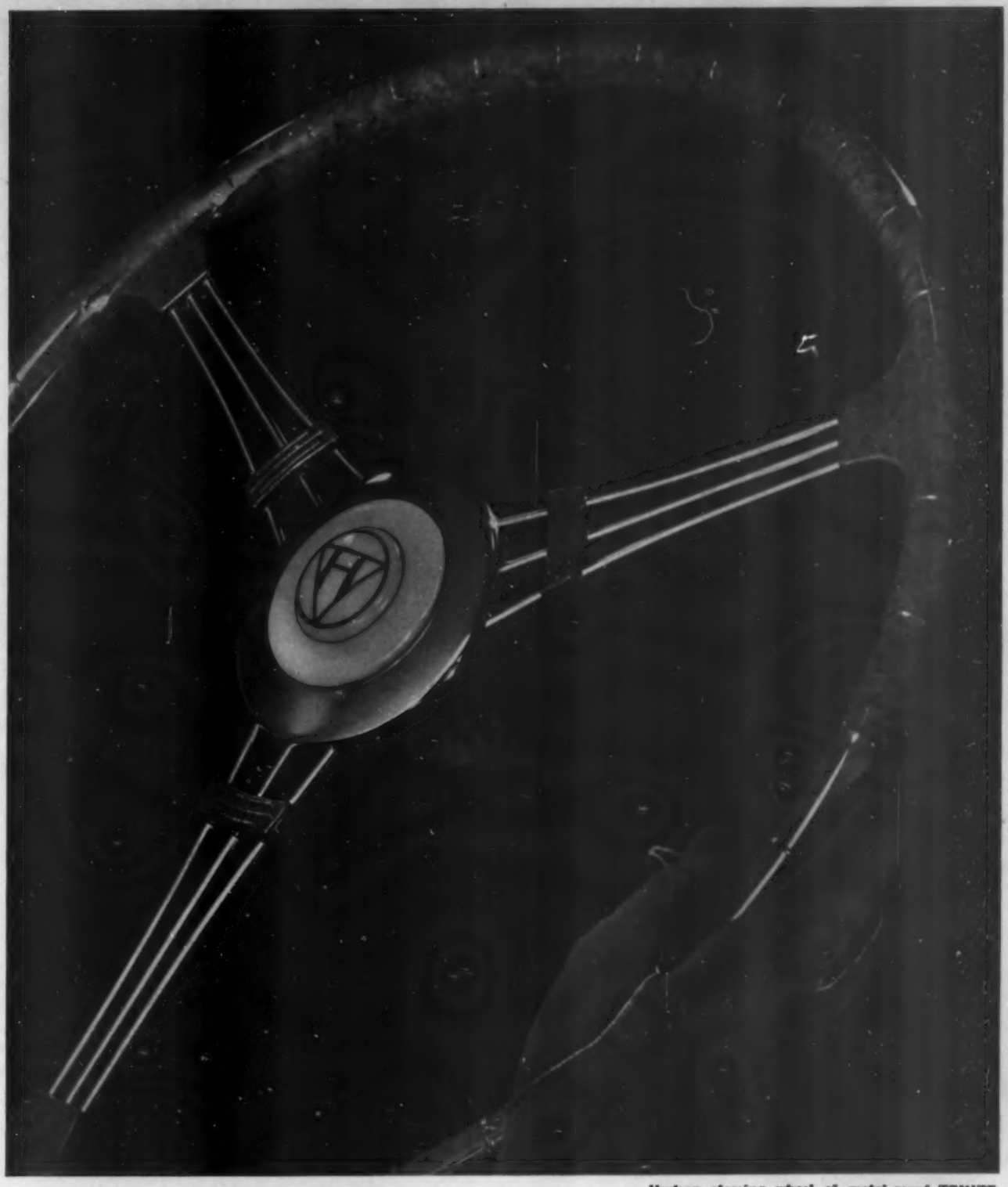
● From chewing gum to doll heads is not such a wide jump as it may seem at first glance; the gap has been bridged by a laboratory hitherto known for its inventions in the art of compounding and manufacturing chewing gum. The doll heads are faced with an outer skin or rubber, but they are shaped from a composition of chicle, coumarone resin, a plasticizer and softener such as mineral oil, and a suitable proportion of plastic rubber, i.e., rubber which has been well broken down on a roll mill. This blend of materials gives a composition which is permanently plastic, hence the doll heads are not easily broken. (John O. Barker, Sweets Laboratories, Inc., New York City; U. S. P. 2,024,124).

● The manufacture of synthetic resins, such as phenol-formaldehyde and urea-formaldehyde resins, and also of the hardened casein plastics, is greatly simplified by a new invention which employs neither catalysts nor heat treatment. Catalysts are objectionable because they cannot be economically removed from the resin and frequently they exert their influence even after the resins are molded and continued catalytic action is deleterious. Heat treatment is expensive and difficult to control within the narrow limits which give optimum results. The new method uses neither catalysts nor heat, but achieves the desired result much more satisfactorily without introducing any foreign material and without danger of over-treatment, by subjecting the resin materials or the casein plastic for a short time to a high frequency, low intensity, high voltage electric current. The voltage should be at least 15,000 and the frequency not less than 1,000,000 cycles per second or preferably higher. (Jean de Granville and Leopold Davion, French Patent 788,407).

● The popularity of ornamental arm bands in Europe is responsible for a new idea in premiums. A cigaret manufacturer puts in each package one link, made in a novel design which is protected by a design patent in Germany. When the smoker has accumulated a sufficient number of links he strings them on an elastic tape to make an arm band. Each link is molded from a suitable plastic, in a triangular shape, and is slotted along one side of the triangle in such a way that the elastic can be threaded through from one link to the next. (Kunststoffe, November, p. 288).

● Diaphragms for gasoline pumps, gasoline meters, oil meters and the like must be thoroughly insoluble in the gasoline or oil so that they will not swell, but they must be light and flexible. Diaphragms which meet these requirements eminently well are molded from a specially prepared and compounded resin of the glyptal type, in which China wood oil is used not merely as a compounding ingredient but as an agent for modifying the chemical composition and hence the properties of the resin. Aside from its use in making pump or meter diaphragms, the resin has excellent electrical properties and is useful in the manufacture of insulating tape and like products. (Allgemeine Elektricitäts-Gesellschaft, Berlin; German Patent 619,439).

● Transparent containers made of cellulose acetate are increasing in popularity and are being brought out in an ever widening range of styles, sizes, designs and colors for innumerable uses in the German trade. Improved molding and dipping methods have enabled the manufacturers to abandon the laminated foil method of production, thus favoring extension from known to new types of containers. Tooth brush holders, salt and pepper shakers, food containers and tubes for various purposes are among the articles being manufactured. The untreated cellulose acetate material is waterproof to liquid water, but readily transmits water vapor and so must be moisture-proofed for use with foods or other products which must be kept fresh. (T. Baumgärtel, Kunststoffe, November, p. 283-284).



Hudson steering wheel of metal-cored TENITE molded by the Sheller Manufacturing Corporation

TENITE

steering wheels represent an outstanding new use of plastics in motor car appointments. Molded over a metal core, these new wheels combine the toughness of Tenite with the rigidity of metal. Beautiful in coloring, exceptionally smooth and warm to the touch, and free from exudations that soil hands or gloves, Tenite wheels add new features of beauty and utility to the 1936 motor car. Write for booklet on the many other uses of Tenite.

TENNESSEE EASTMAN CORPORATION *(Subsidiary of Eastman Kodak Co.),* **KINGSPORT, TENN.**

Keeping posted

Water-resistant material

Through the use of a new Durez material, called the 75 series, molders of plastics are now able to offer molded parts with a water resistance never before obtainable. When made of this new phenolic plastic material, molded parts will stand up for years despite complete and continual immersion in water. Recent applications for this new material are: a disinfecting device for telephones consisting of a 50% alcohol solution sealed in a Durez cylinder with protruding wick; toilet tank valve assemblies and float balls, and containers for semi-liquids and water-content creams.

New resin-rubber combinations

New resin-rubber combinations employed for the manufacture of brake linings, clutch facings, and similar products are being introduced by Bakelite Corp. By producing sections consisting of asbestos filled material bonded with a combination of two parts rubber and one part of Bakelite resin, the heat resistance of this new product has been greatly increased. The thermoplasticity at high temperatures (such as 400° F.) has been greatly minimized. There is a distinct improvement in wear resistance at high temperatures it is reported.

Happy days

Vacations with pay for hourly paid employees of the General Electric Company, abolished several years ago, will be restored in 1936, according to Gerard Swope, president of the company, in an official statement announcing company policies governing wages, hours and working conditions for employees. The statement, published in booklet form, has been distributed to all employees.

New publication

Durez Plastics News, a neat little four-page publication launched in December will reach several thousand American manufacturers monthly, says Herb Spencer of General Plastics, Inc. According to its subtitle it will devote its efforts to picturing and describing product improvement. It will be sent regularly to any of our readers who request it.

W. W. Miller dies

William W. Miller, manager of the General Electric Company's Industrial Department, died in Schenectady, Dec. 22, following an operation for a ruptured appendix which he underwent two weeks previously. He was 55 years old.

Born in Rochester, N. Y., Mr. Miller moved to Schenectady with his parents when he was 5 years old, in 1885, and when he was 12 did his first work for General Electric, being employed as an office boy during summer vacation from school.

Graduating from the Union Classical Institute in 1897, he worked for a year as office boy in what was then the General Electric Power and Mining Department when he obtained a leave of absence to go to the Spanish-American war with the Second New York Infantry. Returning to General Electric in 1899, he was assigned to the Armature and Coil-winding Department and, while working days, studied electrical engineering at night.

In 1900, he entered the student engineering or "test" course in which he remained until 1902 when he spent a short time in drafting work and then joined the Power and Mining Department, which later became the present Industrial Department of the company.

When the Bausch and Lomb Optical Company of Rochester, N. Y., decided in 1908 to change from mechanical to electrical drive and called on General Electric for assistance, Mr. Miller was assigned to the job and directly supervised the change-over. Upon completion of this work in 1910, he joined General Electric's Railway Engineering Department but a year later returned to the Power and Mining Department where he helped to form, and was placed in charge of, its mining section.

On March 15, 1920, he was made an assistant manager of the Industrial Department and in December, 1929, when E. O. Shreve became an assistant vice-president, Mr. Miller was made the Industrial Department's manager, the position he held at the time of his death. He was a member of the American Institute of Electrical Engineers, the National Electrical Manufacturers Association, and a number of other business and civic organizations.

Packaging exposition

The Sixth Packaging Conferences Clinic and Exposition sponsored by the American Management Association will be held on March 3-6 at the Hotel Pennsylvania, in New York. Conferences and Clinics plan the presentation and discussion of various subjects pertaining to the design, production and merchandising of packages as well as subjects relating to packing and shipping.

Among those who will have exhibits at the exposition are the following companies, Bakelite Corp.; Celluloid Corp.; Du Pont Cellophane; General Plastics, Inc.; Hercules Powder; Sylvania Industrial Corp. Other exhibitors include manufacturers of packaging machinery and packaging materials. Alvin E. Dodd executive vice-president of American Management Association is in charge of the exhibition.

Men move

Detroit Paper Products Corporation, manufacturers of Hermetex Insulation and molded breaker strips for the refrigeration industry, announce that their new plastics division is now under the direction of Arthur J. Norton. Mr. Norton was formerly chemical director of General Plastics Inc. of North Tonawanda. Previous to his association with the plastics industry he worked for Merck & Co., Inc., makers of pharmaceutical chemicals.

James M. Connelly is now in charge of manufacturing in this division. Mr. Connelly was formerly cabinet engineer and chemist at Kelvinator Corp., be-

FEMININE APPEAL

YARN MAID
BY RITTER-CARLTON COMPANY, NEW YORK
MOULDED BY KUHN & JACOB MOULDING & TOOL CO.
TRENTON, N. J.
UNYTE PASTEL SHADES

UNYTE CORPORATION
521 FIFTH AVENUE, NEW YORK CITY

UNYTE
REG. U.S. PAT. OFF.
MOLDING COMPOUNDS

Keeping posted

(*Continued from page 38*)

ing associated with them at the consolidation of the Nizer Corp. with Kelvinator. Before that he worked with the Remy Electric Co. after leaving the University of Indiana. The new plastics division is devoted primarily to the molding of materials for the refrigeration industry, but Mr. Connelly expects to branch out into other fields of large moldings shortly.

New automatic molding plant

Believing that industrial progress lies in diversification, the Erie Resistor Corporation, pioneer carbon resistor manufacturer for the radio industry, has installed a division for custom plastics molding. Automatic molding equipment places this company in a superior position for furnishing extremely large quantities of molded goods in comparatively short production time. For designing or redesigning products the Erie Resistor Corporation is in a position to furnish suggestions in the form of sketches and drawings from the hand of a well known industrial artist.

Brazilian Representative

A. Brickman, representing the importing house of B. Herzog, Rio de Janeiro, has returned to Brazil and invites correspondence with manufacturers interested in introducing their line into the Brazilian market. He can be reached in care of B. Herzog, Rua General Camara, 211-213, Rio de Janeiro.

Chemical exposition a success

The rise of American chemistry and chemical engineering, interpreted through its Exposition of Chemical Industries during the past twenty years, was brought to a new climax this year with the fifteenth exposition, held at Grand Central Palace, New York, December 2-7. Two hundred and fifty-seven exhibitors gave visual indication that the American chemical industry is depression proof. They portrayed the industry in terms of its basic principles and at the same time recognized the showmanship which the modern tempo demands. Exhibits were built to be interesting not merely to inform. The dynamic superseded the static. Illumination was adapted to the eye of the visitor, and operating mechanisms were designed to tell the story even without words. All this simplified the problem of the chemist or business executive in hopes of glimpsing the two year chemical advance of America in a period of a few hours.

Virtually the same number of modern synthetic plastics was exhibited as at the previous exposition, but their new interesting uses seem to increase like the compounds in organic chemistry. The cast phenolic resins seem to become increasingly promising for a wide range of ornamental and decorative specialties. The applications range from dominoes to ecclesiastical goods, and to elevator fittings. The best revelation of the rise of plastics was given in a silver anniversary booklet distributed by the pioneer manufacturer in this field. From speeding up production through the use of modern plant machinery—much of which had to be especially designed for the new materials—to developing colors which would be permanent and offer no manufacturing difficulty, the industry can be seen to have conquered a great field. In size the molded plastics applications range from tiny bushings like parts in a watch movement to rayon spinning buckets, wall board, and grinding wheels. The modern handset telephone is a splendid example of their use.

Bakelite-Rogers board

Bakelite-Rogers Board is a new material, consisting of pulp and fibrous products treated with Bakelite resinoid. It is manufactured by Bakelite-Rogers Company, Inc., an affiliate of Bakelite Corp. This material may be molded into some shapes and approaches Bakelite laminated in mechanical strength. Articles such as refrigerator breaker strips, saw handles, knobs, molded trays, baseboards and trim, textile bobbins and spools, are examples of products fabricated from it.

New Name

On January first Toledo Synthetic Products, Inc. became Plaskon Co., Inc., which appears to be a more appropriate name. The company is desirous of having it stated that no changes of policy or organization are contemplated and that the change concerns only its name.

Simplified temperature control

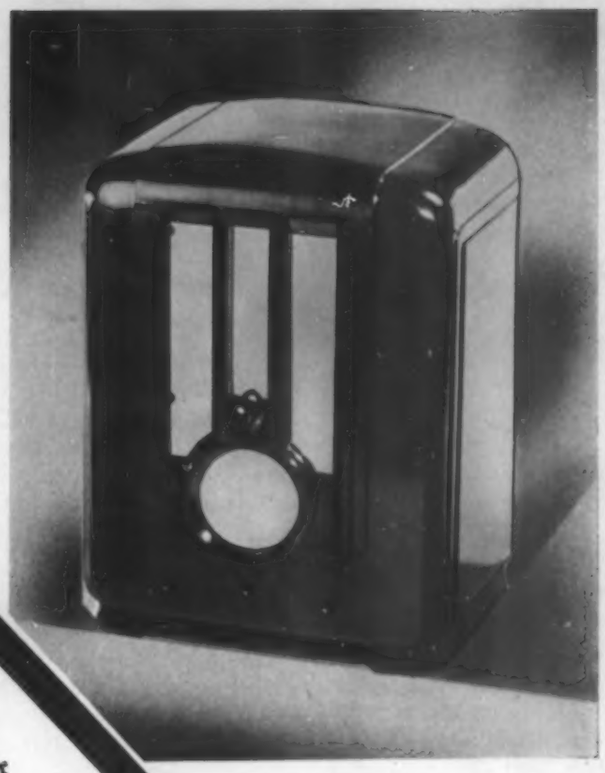
A new method of temperature control has been devised which is known as the Wheelco System of Automatic Temperature Control. Unlike other systems or methods used in pyrometric indicating, recording or control devices, the pointer of the galvanometer has no mechanical work to do to cause the relay to successfully function.

This fundamental feature and its successful and positive accomplishment by the Wheelco method affords a simplified control means—obviating the use of mechanical contrivances such as gears, motors, depressor bars, springs, cams, etc., in an indicating and control device. By the very nature of the No Contact System employed, accuracy of control—that is the translation of mechanical motion on the scale to electrical function of the contactor—may, by a permanent adjustment, be made as broad as the scale or as narrow as is required.

Among the devices which this company offers is a Temperature Limit Control called the Wheelco Limitrol. This instrument is designed to operate with any present auxiliary or relay means of control in use. It can be adapted to indicate the temperature within any range between zero and 3000 degrees F. An indicator is set at the limit of temperature desired. When the temperature in the oven or furnace reaches this limit, the Limitrol will signal a warning by light or bell (both if desired) and shut off the furnace or oven. Here would seem to be a dependable robot constantly on guard as a safety element, to prevent the spoiling of a batch or load, save the interior furnace or oven construction and often times, costly alloys.

It is reported that this Wheelco System as applied to

LARGE RADIO CABINETS PRESENT ONE OF THE MOST DIFFICULT MOLDING PROBLEMS



Pilot Cabinet molded of Bakelite, 12½" high x 9½" wide x 6½" deep.

Accuracy of specifications
Economy over wood
Smartness of design
caused leading Radio Manufacturers to choose ATTLEBORO for superior Molded Cabinets.

RADIO cabinets are among the largest and most difficult of all large-production moldings. Yet the design, the quality of finish and strength of structure must be higher than in most ordinary phenolic moldings.

It is significant that large users of radio cabinets have selected us for their molding requirements.

What Attleboro has done for these firms it will do for you. Benefit from our modern plant, our own mold making facilities, our skilled engineers, our trained workers. **Write, wire or telephone us regarding your molding problems.**

All models shown designed by Jan Streng.

Emerson Cabinet 6¾" high x 9¼" wide x 4¾" deep. Note fine surface and number of portes.

Emerson Cabinet 9½" high x 7" wide x 4½" deep. Note fine surface detail

ASSOCIATED ATTLEBORO MANUFACTURERS, INC.

ATTLEBORO, MASSACHUSETTS

control, should find its practical and profitable use in many processes where it is essential to maintain temperatures within a narrow or restricted range, and where the danger of injury to batch or furnace might accrue with excess temperature. In many cases the saving of the loss on a single load would justify the installation of such a safety device, besides minimizing the chances of carelessness or lack of proper, constant attention of the human element.

New fabricators

Plastic Fabricators, specializing in special order and creative developments of cast resins in architectural, interior decorating, sign and lighting fixture fields, has opened its new offices and plant at 146 West 26th St., N. Y. C., where it occupies the entire tenth floor. Albert Q. Maisel, formerly associate editor and a frequent contributor to MODERN PLASTICS, is associated, with Maxwell Feller, as president.

Excuse please

The memorandum-calendar illustrated as number 4 in an article "Hardy advertising perennials" in our December issue was erroneously credited to Boonton Molding Co. We have been informed since that this molding is made for Keith Clark Co. by Waterbury Button Co.

Books of the month

The Chemistry of Synthetic Resins

By Carleton Ellis
Reinhold Publ. Corp. (Two volumes $19.50)

Carleton Ellis, in his new books "The Chemistry of Synthetic Resins" in two volumes, has answered all the questions, or nearly all, that arise daily whenever designers, engineers and executives get together to discuss the choice of materials for new products or the choice of new materials for old products. He has answered them in language anyone can understand yet supplements his comment with formulae and equations to satisfy the most quizzical engineer and chemist as to the why and wherefore of synthetic resins.

He begins with a genesis of definitions and classifications, then proceeds methodically with the materials in their resinous stage, explaining the nature of resinous formation, through their manufacture and fabrication to final testing and use. He goes sufficiently into the various classifications of resinous materials to present a complete picture, not only of their chemical ancestry, but of their comparative qualities and properties to make intelligent choice and application an easy matter.

The overwhelming number of synthetic resins and other synthetic products germinating in recent years, creates a fruitful field for research and exploration. Probably no one is better qualified to write on this subject, and no one could have done so more ably than has Mr. Ellis. It is difficult to conceive of any one engaged or materially interested in the plastics industry getting on without these splendid books now that they are available.

New chemical catalog

The latest edition of "Chemicals by Glyco" has just been published. Several new products which were on display at the recent Chemical Exposition are fully described. Amongst these might be mentioned Diglycol Laurate, Abopon, Proofit, a one bath waterproofing agent, Lohrinol, a wetting agent especially suitable in acids and hard water. A welcome addition to the Chemical and Physical tables has been the inclusion of pH tables of the most common acids and bases.

Technical book catalog

"If I Only Had That Book" is the caption of the latest technical book catalog by the Chemical Publishing Co.—it's just off the press. Over 1,300 domestic and foreign technical books of all publishers are included. For the first time, it is now possible for any technical worker to obtain on one order, from one source, any technical book. Just write and ask for Catalog #3. It's free to technical workers.

Japanese Year Book

The first edition of "Nippon Celluloid and Other Plastics Year Book" for 1936 has just been issued. In more than 200 pages, its publishers have set forth the developments of plastics in Japan, illustrating many products in the first section of the book.

Celluloid is the center of Japanese plastics but resins and caseins are growing in popularity and production. In a letter which came with the year book, the publishers express their thanks to America and all other countries for the generous spirit of cooperation they have shown in correspondence and exchange of ideas through various publications. The year book is printed in Japanese.

Plastics machinery

A plastics section (catalog 35) has been issued by Baker Perkins Co., Inc. Thirty-six pages of description and illustration gives a comprehensive outline of the various mixing and kneading machines, shredders, dispensers, and baking equipment made by the company for the chemical and process industries.

New bowl mill

The Raymond Bros. Impact Pulverizer Co. announces an entirely new grinding principle which eliminates metal-to-metal contact in pulverizing, and radically reduces power costs and mill maintenance. Those who produce any kind of powdered materials ranging from 10 to 325 mesh fineness are invited to write for an illustrated circular which sets forth the possibilities of this new bowl mill.

Nickel-clad steel

Lukens Steel Co. has issued a new 24-page publication on Lukens Nickel-Clad Steel. Included among the numerous illustrations of nickel-clad equipment are many units that might be used in the manufacture of plastic materials. A copy of the book is available to those who wish one.

Letters from readers

Stock Mold Dept., MODERN PLASTICS:

I note your new department in December issue. Attached see copy of specifications for item we are developing for the advertising specialty market. One further consideration: May be of most inexpensive molded material, but MUST be low in cost to crash this market. Perhaps you can refer our letter to manufacturer in position to supply from stock molds. If so, will greatly appreciate your courtesy.

Required: An Electric Lamp Base of molded plastics, with regulation electric light socket molded or cast integral, providing means for attaching cord, and outlet for cord through base at the side. To be approximately 4 to 4½ inches in diameter and not over 3½ to 4 inches in height from bottom of base to top of light socket, and either round or hexagonal in shape, plain or ornamental, in solid or mottled light or dark colors, and of material to conform with Underwriters' requirements, and as light in weight as possible consistent with safety and durability required in this type article.

Yours very truly,
A. L. Warren
WARREN SALES COMPANY
4230 So. 27th Street
Omaha, Nebr.

(Editor's note) If any molders have stock molds which will fill this request for a lamp base we suggest they write to the Warren Sales Company direct.

Editor, MODERN PLASTICS:

We have noted in the December, 1935 issue of your magazine called MODERN PLASTICS that you are beginning to show stock molds. We, as manufacturers, wish to commend you on this decision and certainly are glad to see a page of this type in a magazine.

One of the principal reasons why we do not use plastics more on our products is because of the comparatively high die cost. We are continually attempting to locate suitable stock models. Most manufacturers who do have stock models do not have a catalog or sheets to show the styles available. There is no way to know what they have outside of long and laborious correspondence. Then they send samples which are frequently lost.

We would like to get full information as to the manufacturers of the items numbered: 14-18-19-20-21 and 22 on page 30 of your December issue.

We appreciate your starting this service and hope that you see fit to keep it up even on a more elaborate basis in the future.

Yours very truly,
THE SWARTZBAUGH MFG. COMPANY
Wm. P. Von Behren
Chief Engineer

Stock Mold Dept., MODERN PLASTICS:

We are in the market for a stock mould for a skillet handle. If you know of someone making these, please let us hear from you.

Yours very truly,
TENNESSEE STOVE WORKS.

- - or its optical equivalent

(*Continued from page 13*) urea fixture (Fig. 6) recently appeared on the market and is supported by flexible chains from a screw-in socket that fits any existing overhead fixture. Its reflector, having a fifteen inch spread, is ideally suited to office lighting as well as for homes. It is carefully designed to obtain maximum efficiency from a bulb of 100 or 150 watts and its wall thickness is controlled in such a manner that no light and dark spots appear when the fixture is lighted. Diffusion is so complete that the fixture appears of uniform thickness and color throughout. Even the spot nearest the filament admits no greater light to pass than appears at the outer edge or rim of the reflector. It has about one-third the weight it would have if made of glass which makes its sale over the counter both natural and practical. Delivery loss and packing costs are cut to a minimum because the complete fixture may be wrapped in paper as an ordinary lamp shade would be and carried home by the purchaser.

So far we have said nothing about color, yet color plays an important part in the scheme of decoration. Urea lamps and shades may be any color from oyster white through ivory and the pastel shades to black, and what is more, the color goes all the way through. It cannot be washed or scraped off by cleaning. This opens the field of urea lamps without limitations. Shades and reflectors are by no means the extent to which ureas can be used. The Bryant Electric Company is molding and distributing a decorative boudoir lamp (Fig. 1) which retails at a popular price. It stands 12 inches high with a shade 6½ inches in diameter and is offered to an appreciative market in six different colors. This company also molds all the urea shades illustrated and referred to in this article including those bearing the I.E.S. tag of approval. It markets, however, only the lamp designated as Fig. 1, page 11.

With recognition by the I.E.S. that ureas of certain grades are the optical equivalent of white diffusing glass for use in its approved reflectors, it will be interesting to watch the development of these materials progress in the manufacture of lamps as manufacturers begin to share this appreciation of the merits of the material and become conscious of its advantages.

Greeting New Competition

(*Continued from page 23*) process to a single molding operation. It has also helped considerably to lower the cost of these frames so that today it has enabled American manufacturers to meet successfully the sudden onslaught of foreign competition. Side combs, which have given definite indication of returning within the realms of fashion, offer another example of merchandise ideally suited for this type of molding. Bandeaux, fountain pen barrels and caps, pencils, bracelets, rings, golf club ferrules, screw driver handles, bobbins for textile and electrical fields, and many such objects are outlets for the injection molding process of cellulose plastics. Intricate and unusual shapes are made possible by this method.

"Concerning future developments of injection molding," says Mr. Landes, "there is a patent situation which should be cleared up for the good of the indus-

try so it can go ahead on a much broader scale than is possible now. Apparently this cannot be accomplished without litigation, which will probably be a long drawn-out procedure."

Although phenolic materials have encroached to some extent on the cellulose plastics market, they really cater to another class. Because their product is so much less per pound, they have been able to work into a price field seldom approached by cellulose plastics suppliers. Cast resins, however, because of their better color than other types of phenolic materials, have made some inroads into the novelty jewelry, button and cutlery fields, but these types of materials are gradually branching out into decorative fields where their opportunities are infinitely greater. Then, too, the rapid manufacture of cellulose plastics by the injection molding process discourages active competition. This is easily understood by comparison of methods employed. The fabrication of cast resins requires several operations to machine and finish whereas cellulose plastics molded with the injection process require virtually one or two operations. Consequently, where large quantities of any particular shape are desired the lower cost of cast resins is entirely offset by the cellulose plastics where their application is suitable and when the articles fabricated of them are made through the injection molding process.

It is fortunate perhaps that phenolics and ureas came at a time when lower priced materials were in demand. Because of this they have attained their greatest growth within the last five years. This fact also has caused the manufacturers of cellulose acetates to do a lot of thinking about the cost of raw materials, with the result that wood pulp has replaced cotton linters to a great extent bringing the cost of raw materials down and it is expected that there will be an appreciable reduction in the cost of solvents before long. An important development along this line lies in the recent discovery that organic solvents can be obtained from petroleum, though formerly made through a process of fermentation. Then, too, there is a continuous search for lower priced plasticizers. Just what effect this will have on the price structure of cellulose plastics depends upon volume, also, it will be partly offset at least by the trends toward higher basic costs generally.

"Taken as a whole," says Mr. Landes, "the cellulose plastic industry has benefited rather than suffered through the arrival of thermosetting plastics and cast resins, and the additional effort this pressure has caused enabled us to maintain a fairly steady rate of production. If any sizable application demanding cellulose plastics came along, it would find the entire output of the country pretty well absorbed and expansion would become an absolute necessity."

"It's an odd thing," he continues, "but almost no new developments have been brought about within the industry itself. By that I mean that the inventive genius of people in other lines of business have in the past introduced nearly all the new ideas and created fields for materials supplied by us. Fountain pens, for instance, led one such advance. Until 1925, almost all of them were made of hard rubber and about the only colors available were red and black. In that year, W. A. Sheaffer Pen Company conceived the idea of making pens from celluloid, with the result that their

business was revolutionized overnight. Other fountain pen manufacturers quickly followed their lead until now 90% of all fountain pens made in this country are of cellulose."

Safety glass, according to Mr. Landes, came about in much the same way although it was really discovered by a French chemist accidentally. A glass flask containing a solution of nitro cellulose was left exposed to the air and evaporation left a coating of celluloid clinging to the inside surface. The flask was dropped one day and although it broke the celluloid coating held the glass together in such a way that there were no sharp or jagged edges. In this manner the idea was born and although the development was necessarily slow, safety glass had become available for the protection of automobile drivers and passengers and for many other uses. It is questionable just how long cellulose will continue to be the dominating factor in the manufacture of safety glass, however. Other materials are being tried but none so far have proved to be better. Tempered glass, which is quite flexible, has gained some headway but it is not altogether unbreakable. It is claimed that a piece the size of a windshield will support the weight of a man weighing 150 pounds.

Spirally wrapped tubing for fountain pens is one of the more recent developments in the cellulose plastics field. For a long time fountain pens were made of solid rods which had to be shaped and drilled much as cast resins are fabricated today. The new development makes it possible to cut the material in strips from thin sheets and wrap these around a mandrel where they are spliced under heat so that no laps show. Nearly all fountain pens are being made in this way at the present time.

"Perhaps the greatest future for cellulose plastics," says Mr. Landes, "lies in applications where the material has to be formed or molded, swaged or drawn and where color and luster will attract sales. Wherever it is necessary to use thin gauge sheets, to perform the operations just described, cellulose plastics are peculiarly well adapted, as nothing else has yet been offered that can really take their place. In this connection laminated glass is one of the important outlets just now, but one of the greatest potentials for thin gauged cellulose plastic materials is in the transparent container field, the walls of which range from .005" to .020" in thickness. Packaging projects can take the fullest advantage of this visibility to increase sales. Because of its toughness cellulose plastics can be used even in these thin walled sections where other materials would be inadequate because of their brittleness. It is said that marbles packaged in such a transparent box have increased 500% in sales in chain stores. The importance of transparent containers for increasing sales has been recognized by some of the nationally known companies such as Coty, Hickok, Pioneer Suspender, Columbia Plush and Puff, American Chickle Co., etc."

The new Cello-top of the Coty powder box is another convincing proof of its practicality. The cellulose covering gives full protection to the delicate colorings of the paper and furthermore enhances it by adding to its tonal effect. It also prevents the package from becoming shopworn. Another important development in the cellulose plastics field is the intro-

duction of cellulose acetate playing cards within the last year. Although they are more expensive than paper cards, (even though actually they outlast ten to twenty decks of them) a greater quantity of cellulose acetate sheets will be used in their manufacture when the time arrives for them to be sold at lower prices. Cellulose acetate playing cards can be kept clean and sanitary by occasional washings and add a great deal of enjoyment to any card game.

"Cellulose plastics have another grand opportunity in the automotive field," continues Mr. Landes, "for all sorts of control knobs and coverings for metal handles whenever color and good tactile qualities are desired. It is a simple matter to place a metal handle into a mold and shoot in cellulose acetate powder to give it a perfect covering. This is an ideal method for covering window control handles, door handles and other parts requiring a metal core for strength."

Within the last two years the use of cellulose acetate has been adopted for molded letters and signs, which at this stage looks very promising. Another important industrial project which may eventually use extremely large quantities of pyroxylin sheets is in the oil field. Already various companies in this field are experimenting with pyroxylin sheets to cover their pipe lines so they will be protected against erosion and soil stresses.

Perhaps one of the most interesting developments of the cellulose acetate materials can be cited in the lamp shape industry. Cellulose acetate sheets have offered to the lamp shade industry a range of colors that are unexcelled for mellow, delicate and harmonious effects. In addition to their beautiful colors for lamp shades they embody very practical qualities. For instance they can be washed with damp cloths to remove dust, finger marks and spots. They are also color fast, heat resistant and durable. Their use for lamp shades has been extremely popular and their place in the lamp shade industry will be permanent as one of the basic materials. Cellulose acetate sheets have been used for street lamps also. One installation has been made already in Forest Hills, Long Island. The toughness of the material and its resilience makes it impervious to shock and will, therefore, discourage the ambition of youngsters to improve their marksmanship on street lamp globes.

Another important field that has been opened up for the cellulose plastics branch of the industry is in small hardware tools. Handles for screw drivers, saws and other small tools have been made of them because they are recognized for their superiority over ordinary wooden handles. Steel parts can be inserted into cellulose handles by swaging them on. They offer splendid grips and they are thoroughly insulative and extremely durable.

Still another important development is the use of cellulose plastics in the ladies' handbag field. The past season has shown a marked increase in the use of these materials for handbags and the coming season will undoubtedly show a still larger use. The reasons for the popularity of cellulose plastics in handbags are obvious. They are washable and lend themselves easily in the creation of unusual effects in handbags. The shoe industry also is giving due recognition to cellulose plastics by the adoption of them for box toes and heel coverings in ladies' shoes because they are

shaped easily and hold their shape once formed and wear exceedingly well.

So it goes throughout industry which is discovering that plastics of any type are basic materials upon which engineers and designers can depend for improvement of products and instruments being redesigned to meet new demands and for the creation of new merchandise and its presentation to the public with a design and finish of immediate appeal. It is claimed that more than 25,000 different actual applications of cellulose plastics have been made. The principal companies engaged in the cellulose plastics field, besides Celluloid Corporation are DuPont Viscoloid Company, Fiberloid Corporation, Nixon Nitration works and The Tennessee Eastman Company.

Molded cabinets—or wood?

(*Continued from page 33*) polished furniture, we can achieve rounded pleasing shapes which will have no sharp corners to mar and scratch the table surface.

"Then consider another angle," he continued, "one not often thought of by native Americans but a real headache for the manufacturer with a large export market. When you ship a wood-veneer radio cabinet to India or certain other countries where climatic conditions are extreme, even if you line it with pitch paint, the veneers may start buckling inside of a month. But with plastics you have no such problem. They're unaffected by any of the climatic conditions a radio is likely to be subjected to. They'll stand cold or heat or rapid changes from one to the other and neither dry weather nor excessive humidity will affect them at all."

"But haven't plastics any disadvantages, from a radio man's point of view?" I asked trying to be impartial.

"Yes, I'll admit a few, though some of these are rather due to the way people insist on using and thinking of plastics. One of the real disadvantages is in the case of large models, where—aside from molding difficulties, which are being rapidly overcome with the introduction of better materials and larger presses—you have to add strengthening supports until your costs mount too high. Then, from another angle, the larger radios today are being restricted to the highest price class where you can afford to use better veneers and spend more money working them. When you really spread yourself, as far as price goes, you can achieve some very fine effects in veneers. Manufacturers as well as consumers are slow to realize that table radios should be considered as accessories rather than as furniture. They therefore, may assume a greater degree of modern design as do lamps, clocks, and other utility accessories.

"The one real drawback of plastic radios is not inherent to the plastic materials but rather is due to the general tendency on the part of radio manufacturers and of their buying public to demand plastics that look like wood. That's why two of the three models you came to see me about are done in a plastic imitation of walnut. Quite aside from the theoretical objections to treating plastics as merely imitations of other materials, I feel that they are not quite the best imaginable imitations of walnut veneers. Yet, if people want to fool themselves a little—in a half-

hearted sort of way, for they aren't really fooled at all—I suppose we will have to let them until time and experience educate them to see how much more attractive a design can be when the plastic is used for what it frankly is."

I noticed that both the Colonial Compact Radio, which he designed in 1933 and the new Pilot Radio used metal castings around the edges of the grill spaces and asked Mr. Streng why he didn't put all his decoration right in the plastic molding. He answered that he felt the metal lent a pleasing touch of color and contrast and, in fact, tended to emphasize the remaining decorative touches put directly on the molded cabinet. Then we returned to the subject of plastics used in imitation of wood versus plastics that admitted their true nature, and he showed me an article written about the time the Colonial Compact appeared.

At that time, Mr. Streng pointed out, he had sponsored a radio that used a pure black phenolic plastic and the set outsold, two to one, every other midget radio sold through the same wholesaling outlets. Yet, some of his newest models return to "walnut" plastics and the designer feels, today, that the point isn't worth too much battle. In time, he feels, the public will get over the idea and so will people who sell and make radios. He is more interested, he declares, in developing cabinets that take fuller advantage of the other qualities that molding affords. To illustrate, he showed me one of the drawings now on his boards for development, a sketch calling for a cabinet with both rounded sides and top. This pleasing and sensible effect could not be achieved at any practical cost in wood. Yet, by the simple expedient of using two molds and attaching the front and back halves of the cabinet together, the cabinet becomes thoroughly practical from a production and cost standpoint.

One thing becomes quickly apparent to anyone seeing his drawings of radios-yet-to-be. That is that the day of the one sided cabinet with the works either exposed or boarded up on the back like a summer camp in the winter will soon be associated with the past. It was all right for the days of large console models, when radio was a piece of furniture that naturally stood against a wall, but for the modern midget set and its slightly larger brothers, placed as they often are on middle-of-the-room tables and desks, the cabinet must be equally attractive when seen from any angle, front, back or side. A start in that direction has been made in one of Emerson's wooden models and by some others, and Mr. Streng's new sketches show that such radios present new possibilities for pleasing design in plastics.

Finally we came to talk directly of the future of plastics as a material for radio cabinets. Here Mr. Streng's enthusiasm was unabated. He pointed out that former restrictions on mold size were rapidly disappearing and that molding technique and mold making technique were advancing at such a pace that the designer has diffculty in keeping his plans up to the present possibilities of the material. His new Pilot cabinet is among the largest pieces yet molded in this country, yet he feels that even this is already well within the limits of practical size, both from a cost and production point of view. As a matter of fact,

he has already been commissioned to design a much larger one which he is now working on.

Finally, when asked for a word as to what, if anything, was lacking in the average design for plastic radio cabinets, Mr. Streng answered, "Most of the designs appearing in plastics today just barely touch the possibilities of the material as far as appearance is concerned. Too many designers even attempt to imitate wood construction, which from a plastic point of view often makes such construction less practical than it would be in wood especially where sharp corners are considered desirable."

Models tell designer's story

(*Continued from page 16*) the success of the design can be predicted before a single sample is made in glass. Rods of cellulose bent into shape and carved make convincing models of glass candelabra. They are so like the eventual manufactured piece that it is difficult at a distance to tell them apart even when shown together.

Product designs that must meet requirements of the manufacturer and then win public approval call for a great deal of effort on the part of the designer. Convincing models, according to Mr. Sakier, are absolutely essential. He finds plastic materials not only extremely pliable and pleasant to work with, since they can be turned out on an ordinary lathe and carved with simple engraving tools, but also the best media he has discovered for submitting designs for approval.

Another prominent designer who finds plastics especially desirable for models is Simon De Vaulchier. He believes them especially suitable for carved or repoussé decoration because they make it possible to attain absolute accuracy of design which mold makers can easily reproduce without loss of detail. Clients can appreciate fully the charm and appropriateness of the design in actual relief on the model before going to the expense of making molds.

An interesting example of Mr. De Vaulchier's work is the Jeurelle powder box. The original model, carved and machined from ivory colored plastic, has a finely etched design on the cover. The original, illustrated together with a manufactured piece, shows how closely the two resemble each other.

Mr. De Vaulchier also used clear plastic material in presenting his design of a bottle for Jeurelle Eau de Cologne, illustrated. Sculptured from a solid mass, the model is complete in every detail even to the label. The product offered for sale, also illustrated, shows how exactly the model was reproduced except for the label which was changed after some discussion.

George W. Blow is another firm believer in the efficacy of plastics for modeling purposes. "At one time or another," he says, "we have used practically all the usual materials in creating our original designs. I remember one instance where we even submitted an atomizer disguised as a penquin which was carved from white soap. Soap models, however, will not stand up well when handled freely."

"Concerning plastic models," continues Mr. Blow, "it is possible for the manufacturer to get a more exact reproduction than he ever could from wood or other contemporary material, for it can be sculptured and finished to a high degree of perfection and accuracy.

When it is absolutely right in every detail, it is turned over to the manufacturer, who finds it fairly easy to reproduce in glass or other appropriate material without sacrificing a single line or curve in the design."

Mr. Blow works out perfume atomizer designs for the De Vilbiss Company almost entirely from cast resins. The atomizers are carved or machined from solid transparent blocks and because these plastics are available in such a wide range of solid colors, mottled effects, light translucent hues and completely transparent water clear form, he has no difficulty in choosing material to represent the color of the finished article. This feature, he finds, is particularly useful for models of bottles, atomizers and other objects to be produced in glass. The low cost of the material is another inducement in its favor for his work. The cost of original models cut from glass and polished would be prohibitive and would prevent the many experiments and changes possible to accomplish simply and quickly with plastics.

Plastic atomizer models in color are such faithful portrayals of the completed piece that when placed side by side, the model cannot easily be recognized, and when they are photographed, it is practically impossible to tell them apart. Mr. Blow recalls an incident where he was rushing through a new design for a client. Glass samples could not be made in time to photograph for use in a catalog being prepared for a special occasion. Therefore, the manufacturer used a photograph of the original model which to all outward appearances was the finished product. Needless to say this is not a common practice but it does emphasize the practicability of plastic models.

Mr. Blow has also found plastics invaluable in experimenting with various shapes to test magnification and refraction of magnifying parts to be made of glass. The actual refraction of the material is not the same as glass but it is quite near enough for research work. It is much easier and less expensive to do the preliminary work with plastics and the results when applied to glass, can be accurately gauged.

Conceiving the idea of a handbag watch, about a year ago, Mr. Blow went ahead and prepared a model in black plastic, on independent patent. With the help of the model he was able to sell his idea to the Western Clock Company, who were so well pleased with the appearance of the original model that they produced the watches with blue, white and black plastic cases. Many thousands of the watches have already been sold and incidentally, the Kaufmann medal, grand prize of the Industrial Arts Exposition held last summer at Rockefeller Center, was awarded to the Western Clock Company for this purse watch, because of its merits of beauty, utility and availability.

The New Hamilton watch box, designed by Georges Wilmet and introduced at Christmas time has been received enthusiastically by Hamilton dealers and their customers. The Hamilton Watch Company, anxious to supply a box that would be distinctive and at the same time embody all the traditions of Hamilton quality and prestige, was interested in plastics for the purpose but was frankly skeptical about its suitability for their package. Through his original model worked out of ivory colored plastics, Mr. Wilmet was able to present convincing proof of the desirability of the material for high class packaging both from the

standpoint of appearance and durability. The cover design, carefully planned and perfectly carved, enabled the molder to get a faithful reproduction and the manufactured box with antique ivory plastic cover and black plastic base is quite at home in any display of fine jewelry. Mr. Wilmet, acting as design counsel for a large molding company, also prepares accurate plastic models of various designs which are submitted to clients for approval before actual production molds are made.

Because of the admirable characteristics of plastic material, its permanence, hardness, toughness and susceptibility to a polishing finish, there is little danger of damage to original models through packing and shipping and through handling by the men who make molds for production. It seems to be the consensus of opinion among designers who have used plastics professionally that no other material is even comparable where a permanent surface with high luster is desired.

Transparent plastics

(*Continued from page 17*) acetate sheets have been found to be more satisfactory with respect to weathering than the nitrate product, they are very susceptible to scratching and are also prone to develop a surface cracking after a few months in service. These factors, of course, lead to an impairment of vision through such material. Recognizing that there is a real need for an improved flexible material for use in curved windows on aircraft, the National Bureau of Standards in cooperation with the National Advisory Committee for Aeronautics is undertaking a study of the available transparent plastics with regard to their suitability for such purpose. A member of the staff has recently called upon a number of manufacturers of cellulose esters and synthetic resins to obtain their aid in furnishing specimens of commercial or experimental transparent products for the test program. Inasmuch as it has been impossible to contact every firm producing such materials, the following brief outline of the proposed investigation has been prepared for publication. It is hoped in this way to reach all interested manufacturers and to avoid the unhappy experience of learning, only upon publication of the experimental results, of some promising materials which could have been included in the tests.

In-so-far as materials to be examined are concerned, the transparent materials listed above do not comprise the entire range of materials which may be suitable for window use. A review of the patent literature in the United States and foreign countries indicates that a variety of plastic materials, including cellulose derivative, natural and synthetic resins, rubber, casein, and gelatin, have been proposed for use either alone in the construction of a glass-like product or as the transparent plastic layer in laminated safety glass. The potential utility of other cellulose esters besides the acetate and nitrate is obvious. Regenerated cellulose plastics such as "Cellophane" and "Sylphrap," and cellulose ethers, for example, ethylcellulose and benzylcellulose, are also of interest. In addition to the glycerylphthalate product mentioned above, the phenol-formaldehyde, urea-formaldehyde, vinyl, vinyl-formaldehyde, vinyl-acetaldehyde, acrylic and methacrylic esters, and styrene types of synthetic resins have

likewise been made sufficiently transparent to serve as windows. A few references from recent literature on transparent plastics, glass substitutes and safety glass, cited at the conclusion of this note, set forth some of the progress being made in this field. It is desired to include samples of all commercially or experimentally available transparent plastics in this program, regardless of their apparent adaptability for specific use as a window material. In addition to indicating directions for further improvement of existing products such a comprehensive study may lead to the development of a laminated transparent plastic, utilizing a material with the desired abrasion resistance for the outer layers, and a softer and more pliable product for the central portion.

In order to obtain data upon the limitations of laminated glass with respect to weight and flexibility, and, equally important, to have a material with a high standard of quality regarding durability, transparency, and hardness, with which to compare the various transparent plastics, it is planned to include samples of such glass in our tests. It is understood that the manufacturers of such products are attempting to further reduce the thickness of the glass layers and increase that of the plastic center in order to make this material more suitable for aeronautical use. We would be interested in hearing from any firms engaged in the preparation of such lightweight laminated glass.

The properties of transparent plastics which are of primary importance in their use on aircraft were listed by various manufacturers and Army and Navy officials as follows: (1) light transmission, (2) freedom from haze, (3) surface imperfections, and constituents which reduce or distort vision, resistance to surface abrasion, (4) flexibility, (5) negligible temperature coefficient of plasticity to give it equal resistance to shock at high and low temperatures, (6) resistance to deterioration by heat, cold, and sunlight, and to the action of water, oil, gasoline, grease, soap, and similar materials, (7) dimensional stability, (8) mechanical strength, and (9) flame resistance. The transparent plastics will be examined for these characteristics. The methods used by a number of laboratories for the measurements of some of these properties were observed recently. It is hoped that some degree of standardization as well as correlation of such test methods may result from the current investigation.

The cellulose acetate and nitrate products now employed are generally supplied to the aircraft industry in sheets 50 by 20 inches. The thickness specified varies from $\frac{1}{16}$ to $\frac{1}{8}$ inch, the average material used being $\frac{3}{32}$ inch thick. For many experimental materials a sheet of this size is impractical at the present time. It is suggested, therefore, that samples having a total area of approximately 2 square feet and varying in thickness from $\frac{1}{32}$ to $\frac{1}{8}$ inch will be satisfactory for obtaining the desired data on transparent plastics. It should be noted that the absence of color is not an essential requirement, since the transparent sheets used on aircraft are very often tinted with light blue or amber dyes.

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Laminated phenolic for radio

(*Continued from page 21*) for 50 minutes, and Sample "C" for 17 minutes. All three materials were pressed under the same hydraulic pressure and at the same temperature. The power factor of each sample was measured before and after immersion in water at room temperature (about 25° C.). The power factor of each sample was measured every day for one week, and then after eleven, twenty, twenty-five, and thirty days immersion in water.

Curve 1 shows the effect of moisture on a highly cured material, and Curve 3 shows the effect of moisture on a slightly undercured material. It is interesting to note that the initial power factors of all three samples were very close together. However, after thirty days immersion, the power factor of Sample "C" had increased to such an extent that its insulating properties could no longer be relied upon for high frequency applications.

Microphotographic studies of laminated material (made with a surface sheet containing 55 to 60 per cent of resin) have revealed that the surface is composed of a practically pure resin film, while the edges are composed of layers of impregnated paper separated by thin films of resin. Exposed fibers are visible on the edges. If the surface film of resin is removed, the material becomes less resistant to moisture, because of the tendency to expose small unprotected fibers. In order to meet certain thickness requirements, it is sometimes necessary to mill the material to very close tolerances. By this operation, the surface resin film is very often completely removed. The milling operation is frequently referred to as "sanding" and is accomplished by passing the material thru two rollers, which are covered with a special type of abrasive paper. The sanding operation is usually limited to one side.

The effect of moisture on the power factor of 1/8 inch thick laminated material in which the surface resin film was removed by sanding is shown in Fig. II.

On Sample "C," the resin film of one surface was completely removed by sanding. For Sample "A," the resin film was removed by sanding and then the entire sample coated with a special insulating varnish, covering both the surfaces and the edges. "B" was not sanded, and the edges and surfaces were not protected.

The reason for the low initial power factor of Sample "A" was probably due to the additional baking which the sample received in curing the protective resin film. The results show that a sanded surface is more sensitive to moisture than an unsanded surface, and that by protecting the edges it is possible to increase the moisture resistance of the material, resulting in a more stable dielectric. The power factor measurements were conducted according to A.S.T.M. Method D150-34T at 1,000 kilocycles.

The material used for the experiments is known as Dilecto Grade XPLW. The resin used in the manufacture of Grade XPLW is a modified phenol-aldehyde resin, and in its cured state is tough and very resistant to moisture.

The influence of moisture on the power factor and methods for increasing the moisture resistance were studied in an endeavor to obtain a material with a

low initial power factor that would not change appreciably when the material was subjected to high humidity. While the water immersion tests are not entirely comparable with humidity tests, it is possible to predict with some degree of accuracy from the results of immersion tests the effect of high humidity on the power factor of laminated material. For example, it was found that a condenser using laminated material "A" (Figure II) when subjected to an atmosphere of 90 per cent relative humidity and a temperature of 85 to 90° F. for eighteen days had a power loss, measured at radio frequency, of thirty-two per cent less than a condenser made with laminated material "C" (Figure II) tested under the same conditions. These results compare favorably with the immersion tests presented in Figure II.

During the past several years many new developments have been made in improving the selectivity of radio apparatus. A factor in this development may be attributed to the steady improvement in the radio frequency properties of the laminated phenolic materials. The continued use of laminated materials for low power factor applications will depend on the improvements which can be made in developing resins possessing better radio frequency properties, and methods for more thoroughly protecting the cellulose fibers. The new materials, besides having excellent electrical qualities, must preserve the mechanical and fabricating properties of the present laminated materials; otherwise their commercial usefulness will be greatly limited.

Decoration speeds night-life

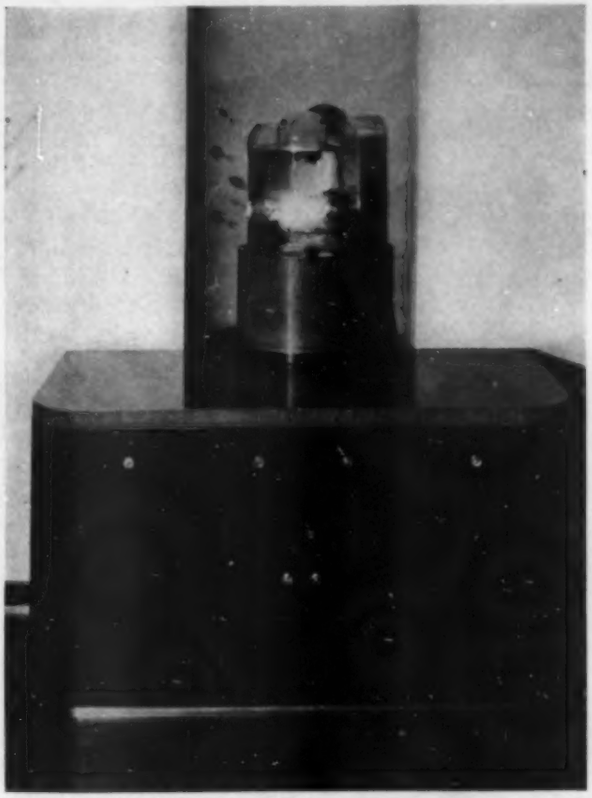
(*Continued from page 19*) whose murals set the period of the room as some time in that glamorous age of court ladies in flowing gowns, in gardens of pomegranates, also has the enhanced attractiveness of tables topped with sleek black laminated plastics in which are inlaid narrow ruby concentric stripes or circles, depending on the shape of the table.

In the Sherry Netherland, one may see what is probably the most extensive application of laminated plastics for any restaurant yet constructed. The large formal restaurant in Classic Modern decoration, the intimate bar adjoining it, and the ladies' powder room on the mezzanine—have been completely "surfaced" in laminated plastics. Only the chairs, floors and ceilings have been constructed of other materials.

In the Netherland Restaurant, a two-story dining room with tall pilasters between the windows on the 59th Street side, and a two-branched winding staircase leading to the balcony on the other, the entire wall surface is smoothly wainscoted with white laminated. No dividing stripes of metal have intruded to break the elegance of the white panels laid flush with each other. Only the pilasters (pillars against the outer wall, between the windows) are black. The large round exteriors of the pillars on the balcony, as well as the table tops in both restaurant and bar, have been covered with black laminated. Even the elevator and service room doors are of the same material, inlaid with inch-wide silver borders in geometric design. The walls of the ladies' powder room are wainscoted with orchid laminations in intimate, informal decore.

In the Pierre Hotel Roof, the new tables have been

topped with laminated plastics in a silvery gray to harmonize with the delicate and sophisticated color scheme of the room. In the Empire Hotel Bar, as in the Paradise Restaurant, and in many other restaurants where the tables do not play a positive role in decorative pattern, plain black laminated is used, while black bar steps and baseboards are used in practically all new installations.



Plastic base for fish bowl, Arcade Bar, Carew Tower, Cincinnati

Occasionally color is used riotously, as in the Caprice Room of the Weylin Hotel, where the tables have inlaid stripes of orange and red on black. The Manhattan Room Bar, at the Hotel New Yorker, has a background of brown with inlaid central designs of cocktail glasses and fruits in "man-about-town" fashion at a dozen different angles, and tables and barfront match in as many colors. The Silver Grill at the Hotel Lexington has tables of diagonal blue and silver stripes on a dark midnight blue background, making a striking appearance at night when the room is used for supper dancing and tablecloths have been removed.

Bars, extravagant in color, have been made of laminated at the hotels decorated by the brothers Eastman. At the Park Central Hotel Palm Bar, on the roof, the bar is inlaid to match the walls whose surface pattern has geometric blocks of laminated plastics in beige, rust, and green, separated by wide fluted silver moldings. The same decorative scheme is carried out in the main floor Coffee Shop which is designed with similar laminated wall treatments.

The design of the bar at the Essex House in New York is formal and elegant with vertical panels of turquoise-peacock blue laminated inlaid with ornate motifs in gold and coral.

Outside New York—in Chicago, Washington, Buffalo, St. Louis, San Francisco, Philadelphia, Cincinnati and many other cities—the movement toward the application of these modern plastic laminations in place of wood, enamel, lacquer and painted plaster is continuing with only a little less speed than it is in New York. Naturally, with fewer night spots per city, the movement can get less impetus there than here.

In Chicago, in a single hotel, the Congress, two unusual applications of laminated plastics play a vital role in the atmosphere of the famous entertainment rooms decorated by the late Joseph Urban and by Nat Eastman, and named for them respectively. In Joseph Urban's room, designed when plastics were still comparatively new, only the baseboard is laminated. In the Eastman casino and lounge, which were designed a few years later, even the ceilings are laminated. They are of chartreuse green, matching the walls, table linen, and even the leather chairs in these glamorous rooms with silver metal cloth drapes at the windows, silver mountings of wall panels and silver stainless steel mountings of furniture. Only the bar itself is of inconspicuous black.

Bars in the Stevens, the Palmer House, the Brevoort, and the Casino Club are other Chicago adaptations of laminated plastics to this type of decoration. Probably one of the most elaborate is the Submarine Bar in the Brevoort, where against a seagreen background silver fish play among reeds and seaweed (all inlaid in metal and black against the green).

The Carew Tower of Cincinnati alone has as many applications of these materials in its entertainment spots as some cities have in several places. It happens that this building houses both the Netherland Plaza, the city's largest hotel, and the Carew Tower Arcade Bar. In the Netherland Plaza both the Mirror Bar, on the third floor, and the Cocktail Terrace, on the first, offer interesting illustrations of the uses of these materials. In the Mirror Bar the front of the bar itself is made entirely of Formica lithographed in a simulated Morocco finish in blue with patterns of black and red. This is one of the few places where this leather-like finish has been used, and one of the most successful, for the finish is strikingly realistic. In the Cocktail Lounge, Jac Lessman, designer, carried out in the design of the bar front as well as in table top design, a color scheme of turquoise, red, and black inlaid on an ivory ground.

In the Carew Tower Arcade Bar designed by a Cincinnati architect, Charles A. Ferber, laminated in a simulated maple finish, giving the illusion of actual wood with all the durability of laminated plastics, was used for the table holding the aquarium, for the bar top and table tops. But plain laminated in a vivid scarlet harmonizing with the chair upholstery is used for the bar front. Another handsome bar application of these materials was made in the large Castle Farm night club near Cincinnati.

St. Louis' Jefferson Hotel, Park Plaza, and Roosevelt Hotel have found their bars and restaurants successful partially, at least, because of the exciting modern decoration in which laminated plastics played prominent roles. The Roosevelt's Wonder Bar and the Park Plaza's Crystal Bar made more conventional applications of black laminations to the bar front and rail. But the Jefferson practically revolutionized a formerly

plain room by providing it with doors of laminated plastics with silver inlaid circle designs and by following the upward line of the short flight of stairs with a waist-high wainscoting of laminated panels in contrasting colors.

On the West Coast, the Hotel Imperial in San Francisco might be named as one of the progressives using this material for the decoration of its bar. The Carlton Hotel, in Washington, was one of the first to realize the adaptability of laminations to decoration of festive spots. Its rotating pyramid bar, so designed that the bartender could stand inside and serve drinks without being seen by the customers, was one of the first in which laminated plastics were used. Here panels of laminated wainscoting between panels of etched glass provided color contrast. Washington's Mayfair Restaurant is another where these materials have been successfully applied.

In Philadelphia, the Benjamin Franklin Hotel Bar and the Twentieth Century Club Bar are "laminated decorated." In the former, the table tops; in the latter, the front of the bar itself.

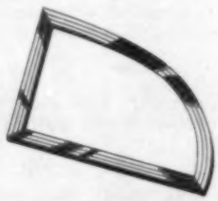
The Louisville Hotel, Louisville, Ky., has one of the most handsome laminated bar fronts in the country. Curving, decorated simply with three giant motifs of tobacco leaves arching gracefully against a plain background, it harmonizes with the tradition as well as the decorative scheme of the hotel. Indirectly lighted, it forms a subtle attention-focus for the entire room. In Scranton, Pennsylvania, the Hotel German's cocktail room has a ceiling of laminated plastic wainscoting. In Baltimore, the Lord Baltimore Hotel Cocktail Lounge is made gay with red laminated table tops and bar step with inlaid silver designs.

In every city, in short, where hotel and restaurant managers are keeping in step with the modern tempo, one finds fresh, new, modern decoration of intimate rendezvous, improving business, with a comparatively moderate initial cost.

Phenolics in tomorrow's car

(*Continued from page 32*) rarely substitute for metals in the same form: redesigning to allow for the plastics' properties is essential.

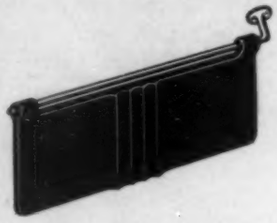
Which brings us to car interiors. Here we find phenolic plastics fitting in nicely because their smooth pleasing automatically-produced luster is obviously superior to the imitation wood effects enameled on metal stampings, and often means production savings.



Furthermore, it can't wear off. On window garnish moldings, for instance, the entire unit can be molded complete, either in one or two pieces, and requires no further handling except drilling. The decorative possibilities are unlimited, with fluted or ribbed aprons, or specially designed sill surfaces, and the luster outlives the car itself, despite constant rubbing.

There is no rusting or chipping, and less resonance from vibration periods.

Molded phenolic visors are another interior application which will bear investigating. These can be made of either molded or laminated plastics, and have the advantage of a permanent luster which can be wiped free of dust much more easily than fabric covered visors. Scratch-proof, grease-proof, stain-proof are other advantages. But molding them in



the same form as the metal-edged visors is unwise; it might be better to use an extension of the hinge-fitting, set into a molded-in groove in order to give the assembly adequate rigidity.

Already being molded in England are dashboard panels, but the American engineer's first question will be about strength, since some cars now use the stamped metal dash for body-bracing. However, with the acknowledged decorative and sales advantages of a molded instrument panel and interesting production costs, we believe bodies will shortly be designed to treat dash panels as non-load-bearing units, bolting on as garnish trim is now attached, after the bodies are completely assembled. Thus the skirt of the top panels acts as the bottom windshield garnish trim.

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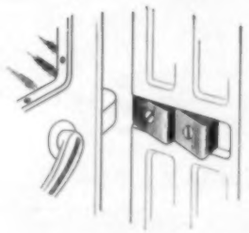
The main advantage of this construction is elimination of the finishing required on the metal dash, which is often done by a special wood-grain technique to overcome the lifeless look of a solid-color lacquer. Designs in flutes, ribs or even bas-relief will be used instead. Also separate bezels, name-plates, grommets —and buffing, spraying, baking, etc.—are all eliminated by using molded panels. They probably won't be molded in one piece at first: three or more moldings. are safer and easier. Other advantages are: less likelihood of vibration-amplification, pleasant feel, sculptural possibilities, round-edged grip-hole for glove compartment door instead of protruding handle, integral light-shades, ashtrays, inserts, etc.

Another mechanical application, especially for the extra-strength friction-resisting molding material recently announced by one of the phenolic manufacturers, is the door latch-plate. Now cast or stamped from ferrous material, they are heavy, tend to rust, are squeaky if not greased, and like most metal-to-metal assemblies they tend to wear. With a molded latch-plate, the latch-bolt is in contact with the non-metallic material when closed, eliminating grease and squeaks. Lighter weight, less wear, quieter closing are other advantages. For this part, the design is all-important; rounded edges on both the plate and the latch-bolt would be required to prevent chipping and gouging of the molding.



A development that may greatly increase the use of plastics on small mechanical parts subject to impact or stress, is the ability to mold an extra-strength phenolic material entirely around a metal core. One of the latest pieces of this description consists of a metal stamping with 1/8 in. layer of plastic material entirely covering it, and which is so strong that hammering it between metal surfaces cannot chip it off appreciably. Composite moldings like this will find many new applications next year.

In addition there are a number of applications which are used by some manufacturers but are not yet universal. Typical of these is molded phenolic door bumper-blocks, with lubricant molded in, and against which the alignment wedges ride when the door is closed. Two popular cars now have them; more will follow. They are squeak-proof, rattle-proof, never require lubrication, and cannot rust or corrode. Gaskets—molded, not punched—from phenolic plastics, are used on many carburetors, since they keep a smooth surface in the vapor-passage, cannot corrode or soften and do not conduct heat to the carburetor and cause vapor-lock. Many extensions in present uses for phenolic plastics, as well as many applications not mentioned here or even thought of, will be found on 1937 and '38 cars—which, it is understood, will incorporate more dramatic developments than have appeared in any previous period.

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